

Curse of All
The BBS Numbers



Computing! Now!

Canada's Personal Computing Magazine

March 1985

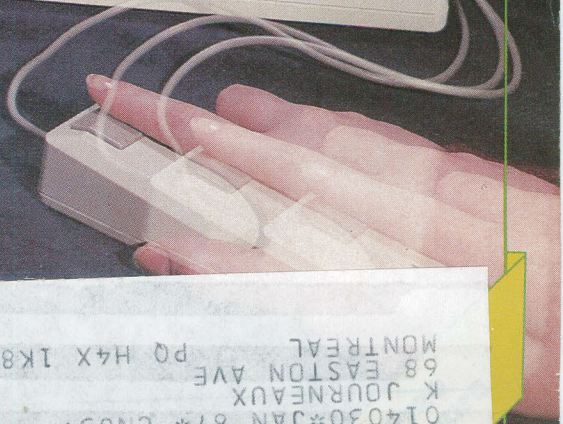
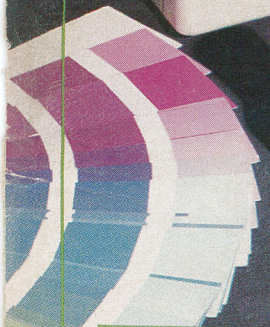
\$3.25
MM70247

Computer Graphics

What light through yonder window...



- QuickDraw in Basic on the Mac
- Assembling Graphics on the PC
- BeatNix CP/M
- Macintosh Technical Drawing



- Commodore Listing Utility
- Fresh Apples

014030*JAN 87* CNO3*
K JOURNEAUX
68 EASTON AVE
MONTREAL
PO H4X 1K8

Almost
Apple 50%

The "BEST" Superb IBM PC & XT Compatibility

Reviewed in March '84 Computing Now!

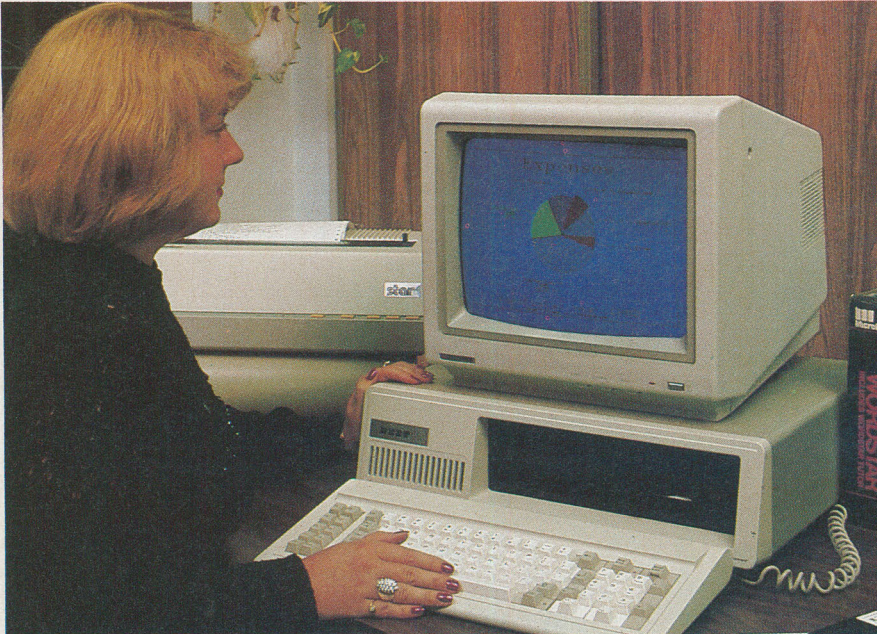
Loaded Best
Special Time — Limited
Promotion

\$1595

This price includes:

- 256K RAM (expandable to 1Meg.)
- Two slimline 360K DS, DD drives
- Colour video board. RGB and composite
- Floppy controller
- Serial port (RS232)
- High quality keyboard
- 150 watt power supply with fan
- 90 day warranty. (Extended warranty available at slightly higher price).
- 230V version available.

Note: Our system comes with the famous Phoenix Bios, currently used by several major computer manufacturers who claim excellent IBM compatibility.



IBM is a registered Trademark of IBM Canada Ltd.

Executive 10Meg BEST

• 10 Meg Hard Disk Drive and Controller and one DS,DD drive; everything else the same as the Loaded BEST described above.

\$2595

Tape drive (for back-up) option now available.

OR Everything described above except with 512K of Memory on Board instead of 256K

\$2995

New Super Loaded Best \$1895

Includes all features of the Loaded Best. But has 512K of on board Memory.

Please Note: Don't be put off by our spectacularly low price; this is due to the fact we do not deal with middlemen and our volume buying power of parts. All BESTs are manufactured in Canada to the highest quality standards using prime, guaranteed components by our sister company. All systems pretested (burnt-in) for about 48 hours before shipping. Hundreds of happy customers report excellent reliability and compatibility.

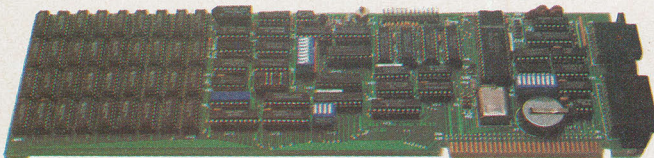
8 Slot Expansion System \$499. For your IBM (PC, XT) Computer or Compatible (For details check catalogue)

(Comes with a Power Supply, Fan ventilation, attractive Housing (same as Best Computer) and a Host Adapter which plugs into your main system and three feet of Ribbon Cable with connectors.

Advantages: • Gives you an extra 8 Buffered Slots • Allows you to convert a PC into a 10 Meg Hard Drive System with lots of Memory and Tape Drive • Allows you to add drives to your system. • Lets your main system run cooler with less load.

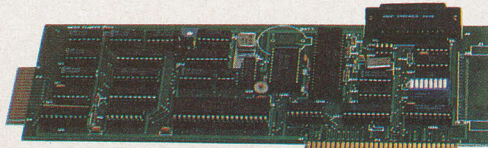
8 Slot expansion with 10 Meg Hard Drive, ready to go **\$1495** 8 Slot expansion with 10 Meg Hard Drive and extra memory or other combination **\$call**

The Best 256K PENTARAM BEST SELLER



\$399.00 with 256K RAM, Real Time Clock Parallel, Serial and Game Port (512K now available)

FLOPPY CONTROLLER BOARD AND OPTIONS

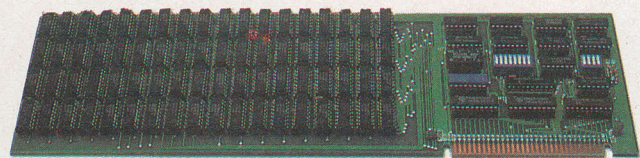


\$129.00 With Real Time Clock and Serial Port only **\$189.00**

EPROM Programmer \$99.00 (with ZIF Socket Adapter)

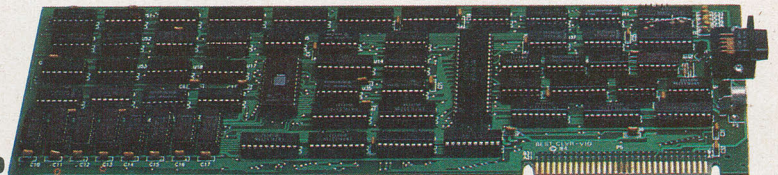
\$159.00 Parallel/Game Port **\$79.00** (cables Extra)

BEST 512K RAM BOARD



\$495.00 (with 512K). With 64K **\$189.00**

Colour Graphics Video Board



\$179.00 (Composite and RGB Output)

Quantity, Students and Teacher discount's available.

CHARGE X

master charge

Exceltronix Computer Division Computers at unbeatable prices! (416) 921-8941, 319 College St., Toronto, Ontario

No returns or exchanges after 7 days. 15% restocking charge.

Prices may change without notification

217 Bank Street, Ottawa (613) 230-9000

MST 152

1-800-268-3798 —
Order line only

EXCELTRONIX

EXCELTRONIX

Long Distance Order line only:
1-800-268-3798

319 College Street, Toronto, Ont, M5T 1S2 (416) 921-8941

217 Bank Street, Ottawa, (613) 230-9000

We guarantee you the combination of **BEST Prices & Service in Canada!**

Star Micronics Gemini 10X 1 year warranty

• 120 c.p.s., • 816 characters print buffer, option 4K or 8K • standard parallel optional RS232C • tractor & friction feed.



\$359.00

Gemini 15X

\$599.00

Same as Gemini 10X. • 15.5" carriage

POWER TYPE LETTER QUALITY **\$639.00**

• 18 CPS bidirectional logic seeking.
• 96 Petal Wheel

EPSON FX 80 **\$645.00**
EPSON FX 100 **\$949.00**

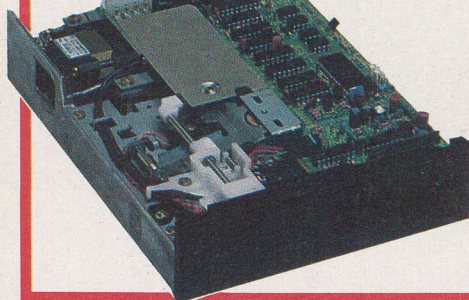
Multiflex parallel Interface for
Apple or IBM **\$ 69.00**

IBM COMPATIBLE KEYBOARDS

Cherry **\$135.00**
Maxiswitch **\$135.00**

Super Special Keytronics Programmable Keyboard (no case) **\$69.00**

IBM Compatible Disk Drive SA455 (with warranty) **\$189**



CASES FOR YOUR IBM Compatibles

• Hinged top cases allowing easy access by opening top half of the case. Can be supplied with plain back or for 5 or 8 slots. Please specify when ordering. **\$74.95**
• Above case with power supply and fan
For Apple compatible 75 Watt **\$169.00**
For IBM compatible 150 Watt **\$219.00**
Hinged Case with 90W (max.)
Power Supply with fan **\$178.00**
As above with 175W (max.)
Power Supply and fan **\$228.00**

APPLE COMPATIBLE DISK DRIVES

Now also available for Apple IIc

**Famous
Multiflex
Disk
Drive**



\$199.00

Features:

• Apple compatible • Attractively packaged • Professionally built and tested • Canadian Made. We believe that Multiflex put out more drives in the last year than all other Canadian manufacturers combined.

Note: For \$179 we offer 120 day warranty. However for 10% more get a full 1 year warranty.

1 year full warrar

Monitors

**Zenith
Data
Systems**



BEST SELLER ZVM 122A • 12" diagonal screen • non-glare amber display • composite input • 25 lines x 40/80 characters **\$139.00**

BEST SELLER ZVM 123A • 12" diagonal screen • non-glare green display • composite input • 25 lines x 40/80 characters **\$129.00**

ZVM 133 • 13" diagonal screen • RGB input • 25 lines x 80 characters • 640 x 240 pixels green screen only switch • 16 colours including PC brown **\$799.00**

Spectacular Pricing on Apple Products — Call for best price

Peripherals for your Apple:

Z80 **\$ 49.00**
80 x 24 Video Card with
Soft Switch **\$ 69.00**
16K RAM Card **\$ 49.00**
128K RAM Card **\$159.00**
Parallel Card with Cable ... **\$ 65.00**
Serial Card **\$ 69.00**
Apple Programmer **\$ 65.00**

BEST IBM Compatible Modem

• Plugs into motherboard
• Excellent Hayes compatibility
• Auto Dial, Auto Answer, Direct-connect
300 Baud **\$179** 300/1200 Baud **\$379**

300 BAUD MODEM for your APPLE **\$79.00**

Auto Answer, Dial, Direct, Con. Plugs right into your Apple, comes with software.

Multiplex 300 Baud Modem

For your Apple (Super compatibility) **\$159.00**

Hard Disk Drive

Seagate (industry favoured)
10 MEG. slimline **\$895.00**
10 MEG Seagate, slimline drive and hard disk controller. This controller can handle up to two 10 MEG hard drives.

Lowest Price of \$1,159.00

Cable extra **\$38.00**
Quantity Discounts Available

MEMORIES, At prices you can't forget! All prime stock and we guarantee the best price.

4116 150 or 200ns **\$ 1.29**
4164 150ns **\$ 3.89**
Sets of 9 **\$32.95**
41256K 150ns **\$26.95**
Sets of 9 **\$234.00**
2114 200ns **\$ 2.50**
6116 150ns **\$ 6.95**
2716 450ns **\$ 4.99**
2716 300ns **\$ 5.99**
2732 350ns **\$ 6.99**
2764 300ns **\$ 8.95**
27128 300ns **\$19.95**

Special Parts for your IBM & Apple Compatibles Intel Parts

8087 **\$199.00**
8088 **\$14.95**
8237A-5 **\$14.95**
8250 **\$11.50**
8253A-5 **\$ 7.69**
8255A-5 **\$ 6.99**
8259A **\$ 6.95**
8284A **\$ 7.75**
8288 **\$15.95**
NEC765/8272 Equiv. **\$14.95**
74CS322 **\$ 6.95**
62 Pin Card Edge Connectors .. **\$ 2.19**
5 Pin Din Connector **\$ 1.29**
100ns Delay Line **\$ 6.50**
6502 CPU **\$ 5.99**
Z80A CPU **\$ 4.99**
68A45 CRT cont. **\$10.79**
TMS99532 FSK Modem **\$19.95**
Set of 8088, 8255A-5, 8237A-5, 8288, 8284, 8253A-5, 8259A **\$73.00**

All Parts in our new 24 page catalogue except Memories and other parts which are advertised on this page are 10% Off, for any student bulk order discounts, can be arranged!

Concorde Breaks the Price Barrier



**A 45 cps Daisy
Wheel Printer \$1495⁰⁰**
Suggested
Retail

The CI Concorde 1100 Printer comes by its name honestly. Its features soar above the competition, while its price stays at ground level.

Beneath a sleek exterior is tucked a simplified mechanism that powers one of the fastest printers around (45 cps). The Concorde 1100 is designed to handle all printing "whisper" quiet (60 dbA) on a generous 13.2-inch printline. It will tackle spreadsheets and graphics as easily as it will all correspondence.

And, first class extras come standard. The popular 96 character print wheel allows access to a wide variety of fonts and pitch sizes, while the print ribbon cartridge is clean and easy to change. Models available include Diablo* and Qume* emulations with a choice of Centronics, RS-232 or Qume interfaces. The Concorde's

internal buffer is expandable to a full 40K so that lengthy print runs don't tie up the computer. Concorde also comes with friction platen and serial or parallel interface. For specialized uses, options include cut-sheet feeder and paper tractor.

For performance without the high price tag, fly with the Concorde.

TORONTO: 55 Torbay Road, Unit #2
Markham, Ontario L3R 1G7
(416) 477-0828

HEAD OFFICE: 17507-107 Avenue
Edmonton, Alberta T5S 1E5
(403) 489-8400 Telex: 037-42881

Distributed exclusively in Canada by

Computron

*Diablo and Qume are registered trademarks
Circle No. 2 on Reader Service Card

Computing Now!

Vol. 2 No. 12
March 1985

Canada's Personal Computing Magazine

Published by
Moorshead Publications
Suite 601, 25 Overlea Blvd.
Toronto, Ont. M4H 1B1
(416) 423-3262

EDITOR
Steve Rimmer

ASSISTANT EDITOR
John Rudzinski

DIRECTOR OF PRODUCTION
Erik Blomkwist

CREATIVE MANAGER
Ann Rodrigues

PRODUCTION
Douglas Goddard
Naznin Sunderji

CIRCULATION MANAGER
Lisa Salvatori

ADVERTISING
Rick May
Montreal (514) 735-5191
Vancouver (604) 688-5914
Western United States
The Brassett Co., Inc.
(213) 802-2571

Publisher: H.W. Moorshead; **Executive Vice-President:** V.K. Marskell; **General Manager:** S. Harrison; **Controller:** B. Shankman; **Accounts:** P. Dunphy; **Reader Services:** C. Wyatt, M. Greenan, H. Brooks, R. Cree; **Advertising Services:** D. Whitehead

©Moorshead Publications Ltd.
NEWSSTAND DISTRIBUTION
Master Media, Oakville, Ont.

PRINTED BY:
Heritage Press Ltd., Mississauga

SUBSCRIPTIONS
\$22.95 (12 issues) \$37.95 (24 issues)
Published 12 times a year

For US rates add \$3 per year.
Other countries add \$5 a year.

Moorshead Publications also
publish Electronics Today, Computers in Education,
and Software Now!

POSTAL INFORMATION

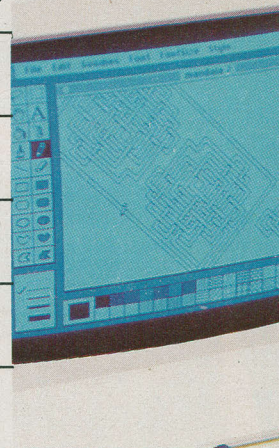
Second Class Mail Registration No. 5946.
Mailing address for subscription orders,
undeliverable copies and change of ad-
dress notice is:

Computing Now!, Suite 601,
25 Overlea Blvd., Toronto,
Ontario, M4H 1B1

Printed in Canada ISSN 0823-6437.



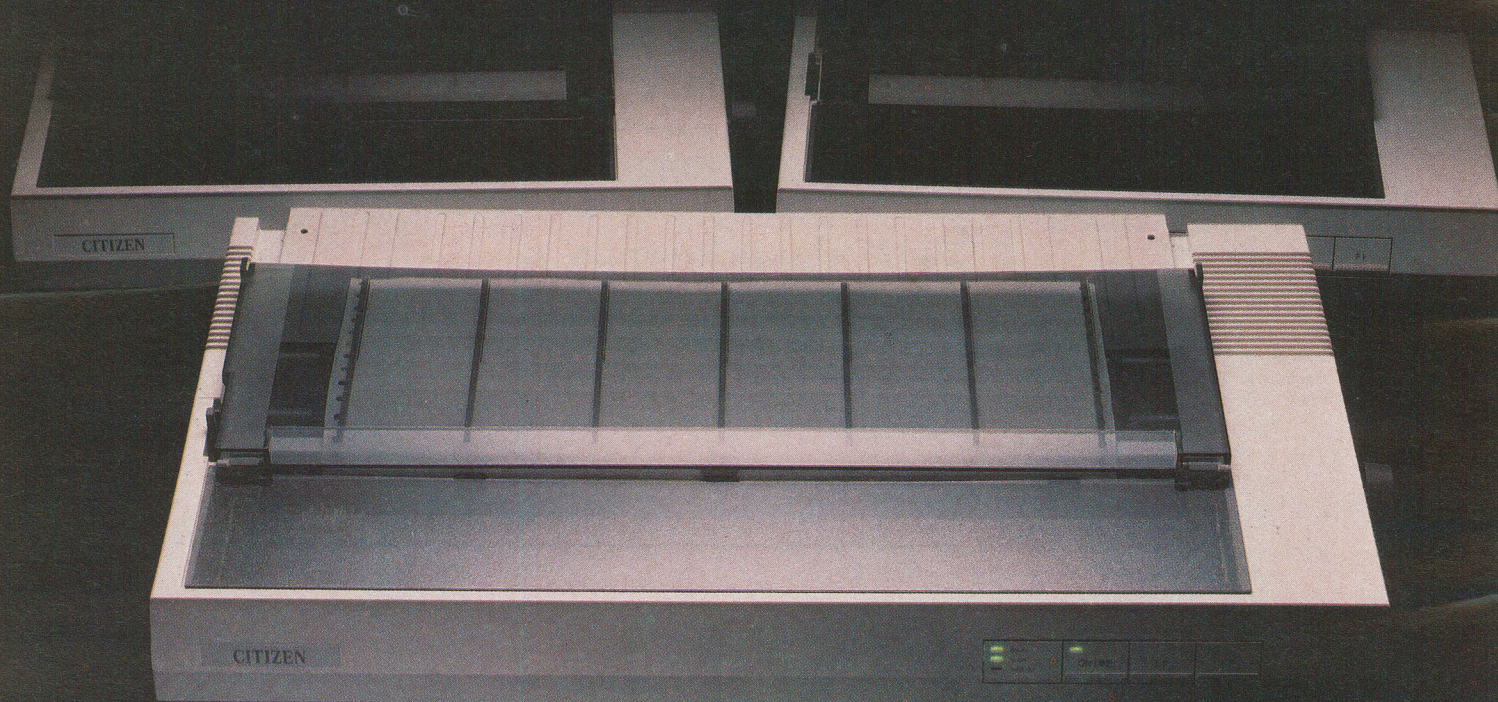
The Hitch Hiker's Guide to the Clone Stores	10
Hewlett Packard's Laser Printer	16
The Tandy 1200 Reviewed	20
Fresh Apples	22
Technical Drawing on the Mac	28
The Curse of All the BBS Numbers in the World	32
Star Powertype Review	34
QuickDraw in BASIC on the Mac	36
The Art of the MDM Overlay	41
The Mortgage Program	46
BeatNix for CP/M	52
Assembling Graphics on the PC	60
Commodore Listing Debugger	66



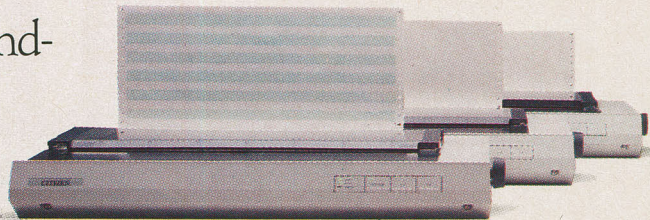
Sectors

Computer Press	9	Technical Writing	69
Next Month	9	Almost Free Apple DOS	71
Mac Electronic Symbols	30	Consulting	72
Product Mart	51	Software Now!	72
Subscriptions	65	Ad Index	78

SOLID CITIZENS.



Presenting four fine, upstanding Citizens who'll give you service and value above and beyond the call of duty for many years to come. Citizen™ dot matrix printers, precision-engineered by the people who've become a wristhold word in fine, precision-engineered watches.



The Citizens are very sleek, very quiet, and reliable as the day is long. They're also exceptionally easy to use, thanks to a unique new push-feed paper loading system. What's more, the Citizens are very versatile. They're IBM® and Epson®-compatible. Can print graphics.

And give you output speeds of 160 cps (40 cps correspondence-quality) or a blazing 200 cps (50 cps correspondence-quality).

The Citizen MSP-10 and 15, and MSP-20 and 25. Precision-engineered printers at a price precision-engineered to put a smile on your face.

Stop by one of our dealers today and watch what the Citizens can do for you.



CITIZEN™

Distributed by:
Ahearn & Soper Inc.



MAIN OFFICE
100 Woodbine Downs Blvd.
Rexdale, Ont., Canada
M9W 5S6
416-675-3999

1750 Courtwood Crescent,
Suite 104
Ottawa, Ont., Canada
K2C 2B5
613-226-4520

177 Merizzi Street
St. Laurent, P.Q., Canada
H4T 1Y3
514-341-7671

3639 26th Street, N.E.
Calgary, Alta., Canada
T1Y 5E1
403-291-0300

3444 Lougheed Highway
Vancouver, B.C., Canada
V5M 2A5
604-251-2226

10329 61st Avenue,
Suite 1
Edmonton, Alta., Canada
T6H 1K9
403-474-0466

Parkdale Plaza
496 Albert Street, Suite 5
Waterloo, Ont., Canada
N2L 3V4
519-885-2260

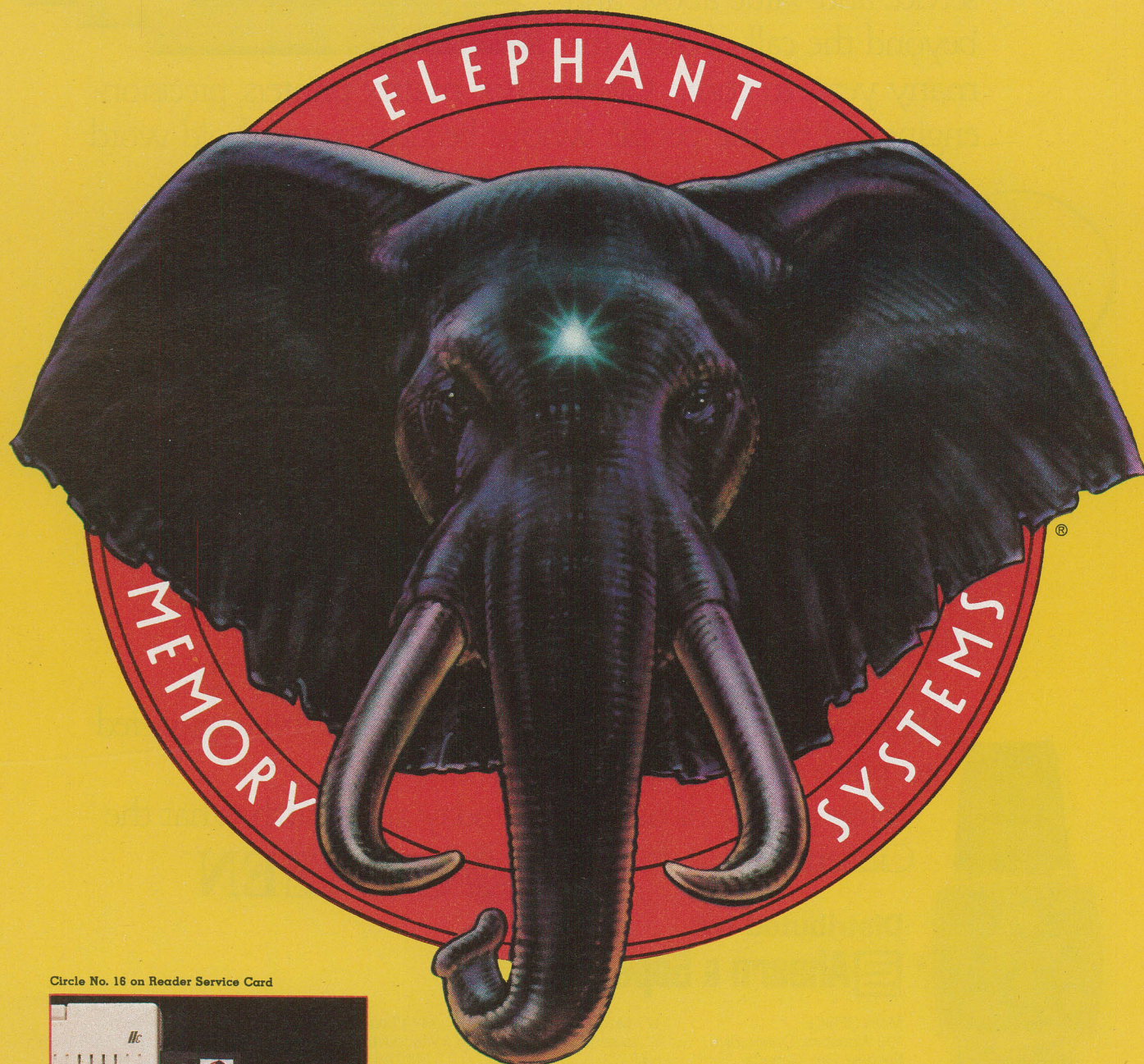
Dealer Inquiries Invited

© 1984 Citizen America Corporation

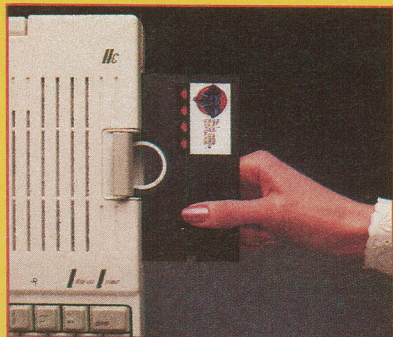
Citizen and the Citizen logo are trademarks of Citizen America Corporation. IBM is a registered trademark of International Business Machines Corporation. Epson is a registered trademark of Epson Corporation.

Circle No. 36 on Reader Service Card

TEST DRIVE AN ELEPHANT.™



Circle No. 16 on Reader Service Card



Dennison Manufacturing Canada Inc.
200 Base Line Road East
Bowmanville, Ontario L1C 1A2

Dennison



Elephant Floppy Disks are the perfect vehicle for storing and protecting data. Because Elephant never forgets. You'll get high performance that's 100% guaranteed for a lifetime of heavy use. So take them for a test drive. They're available now at your local computer showroom. And there's no waiting for delivery.

ELEPHANT™ NEVER FORGETS.

For information call toll-free

1-800-387-5037

BC 112-800-387-5037

Toronto (416) 495-9353

COMPUTER PRESS

Apple Denied Injunction

MONTREAL, QUEBEC — The interlocutory injunction Apple sought against numerous Canadian retailers, importers and distributors of 'Apple compatible' computers has been denied by the Honorable Mr. Justice B. Cullen of the Federal Court of Canada.

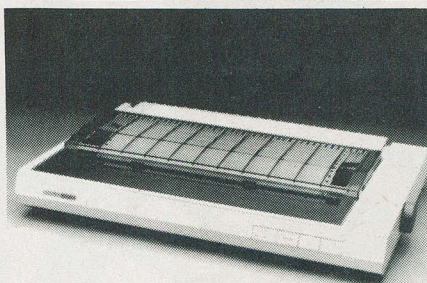
In January of 1984, Apple Canada Incorporated filed a Statement of Claim against various companies and individuals whose number eventually totalled 38. Apple's concern was of Copyright infringement, where the compatible computers hold almost exact copies of Apple's Autostart ROM and Applesoft BASIC in their EPROMs, and of damages Apple

dealers — as well as Apple itself — maintain when Apple compatibles are marketed.

Of the 38 defendants, 18 remained when the decision was passed. The others settled out of court with Apple, were not served, or were dropped by Apple from those named in their claim.

Apple Canada spokesman Bill Holtzman maintains that His Honour "...did not rule on Copyright at all, just damage. The judge took exception to our 'Death by 1000 Cuts' approach."

Apple Canada is appealing the decision, and is hoping to go to trial by early summer.



A line of sleek dot matrix printers is available from *Ahearn and Soper Incorporated*. The *Citizen* printers are fully IBM or Epson compatible, and have switch-selectable speeds of either 160 or 40 (correspondence quality) characters per second. Models are available in either 80 or 165 columns printing width...

Overhead Express is a software product for the IBM PC, PC/XT, PC/AT or compatible with at least 192K and 2 floppy drives. Supporting a wide range of dot matrix printers, the program allows the user to print in a number of fonts ranging from 18 to 75 dots in height. Overhead Express is distributed by *J.B. Marketing of Canada*...

Commodore Price Cuts

AGINCOURT, ONTARIO — In their first price reduction in over a year, Commodore Business Machines Limited has made strides in "...maintaining its number one position in unit sales and in strengthening its presence in home and business applications and educational settings," according to Rich McIntyre, the company's Vice President of Sales.

The reduction affects all Commodore's hardware and software products. Examples of computer price cutting include the Commodore 16's retail of \$149.95 from \$199.95, the +4 at \$399.95 from \$529.95 and the Commodore 64 at \$249.95 from \$429.95.

Graphics Galore

LAYTON, UTAH — *Inovion Corporation* is producing a graphics system that may raise a few artistic eyebrows. The **Inovion Personal Graphics System** features a 6502 microprocessor, a 512 by 480 pixel display with 24 bits per pixel, and the capability to display up to 245,760 colours simultaneously from a palette of 2.1 million colours.

The system is completely mouse driven, outputs to its 19 inch analog RGB monitor, has an RS232C serial port operating at 9600 baud for computer interfacing, and offers 'frame grabbing', where a frame obtained from a VCR, VCR camera or television broadcast can be 'grabbed', digitized, then changed or enhanced by the user.

Inovion Corporation is at 195 East Gentile Street, Layton, Utah 84041 (801) 546-2850.



continued on page 75

Next Month In

Computing Now!

The Survey of the Godz

April brings with it the promise of flowers, new life, tax refunds and our exhaustive bi-annual microcomputer survey. There has been something of shakeout amongst the computer builders of late... you can see quite a few of them hanging around in the park selling circuit boards for two bucks a shot. However, the recent innovations in computer designs have been no less dramatic. There have been some really decent new boxes of technology happening and, perhaps more to the point, quite a number of fairly expensive systems becoming more affordable.

If you plan to buy a computer or just want to keep one or more digits on the state of the art you won't want to even think about missing the April edition of *Computing Now!*

Concurrency on a PC

Running more than one program at a time on a single micro has been possible... at least in theory... for quite a while. It hasn't been notoriously practical, however, until the advent of sixteen bit machines. Early concurrent operating systems often caused irreparable picture tube burn by keeping their "wait" flags on for periods of time exceeding the lives of their operators.

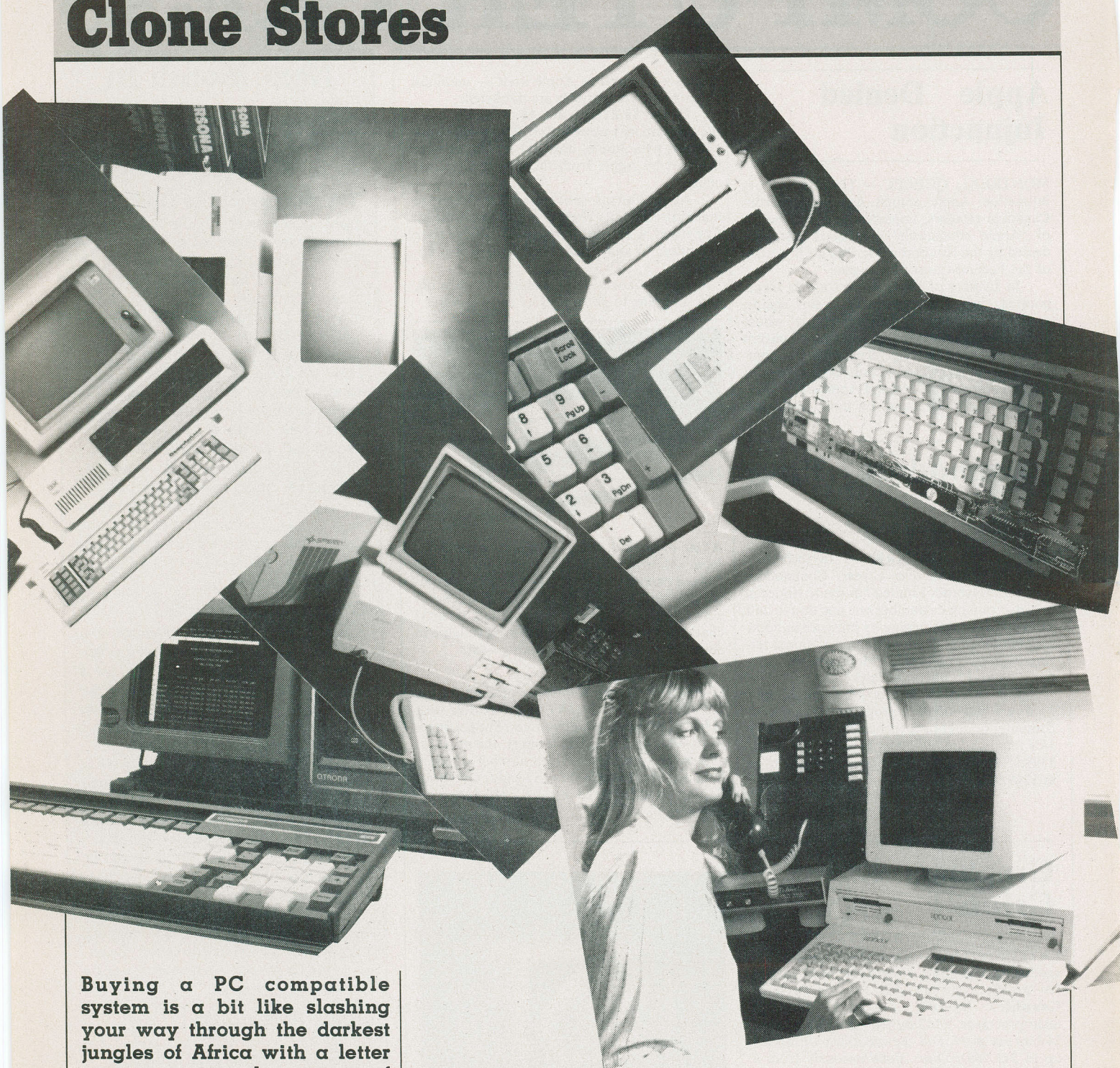
Next month we're going to check out a couple of approaches to concurrent operation on the IBM PC and its compatibles. Whether you are a business user or just like to stare at something blue in the basement, the ability to handle multiple tasks at the same time, flipping effortlessly from one to the other, can expand the usefulness of your computer by an order of magnitude.

Apple Assemblers

Being one of the most popular... as well as probably the most venerable... of all of the contemporary microcomputers, the selection of development tools for the Apple II+ is pretty decent. The next *Computing Now!* will feature an expert overview of the machine language assemblers available for the fruit.

These features are in an advanced state of preparation, but we do reserve the right to change the final contents of the issue prior to its going to press.

The Hitch Hiker's Guide to the Clone Stores



Buying a PC compatible system is a bit like slashing your way through the darkest jungles of Africa with a letter opener... or perhaps one of those electric letter opening machines. You'll need a map at the very least. We've sent the cartographers home and written this one.

by Steve Rimmer

There's a street in Toronto called Queen street and, aside from having... well, rather a lot of queens, actually... it has a plethora of computer stores. You probably have a Queen street where you live. Perhaps you actually live on your particular Queen street. May the creator of all that's material and solid preserve your bones if you step out on Saturday mornings.

In fact, many of the computer stores down on Queen do a brisk trade in all manner of IBM PC compatible computers, which they usually call clones. Radiating outward from this hub of technology are other compatible dealers, most of which are a bit too high brow to use words like "clone". They're into "work alikes"... clones with ties.

A trip down Queen street can be pretty harrowing. They don't actually leap out of the stores and wrap printer cables around your throat to drag you in, but it comes fairly close when the weather gets warm. More to the point, however, is that most of the clones, compatibles and work alikes use virtually the same case and many of the same funny words, so it's very hard to know the difference between a fifteen hundred dollar box from the dude who also fixes major appliances on the side and a five thousand dollar computer deluxe displayed in a carpeted sales suite with muzak in quad.

In this feature we're going to look at some of the things to consider when one goes forth to acquire a PC compatible system. I'm not going to get into specific hardware because it changes so frequently, but, rather, we'll look at the sorts of things you can expect to be faced with when you dust off the Visa and go trolling for silicon.

Cheap and Nasty

One of the great expressions to come out of pulp science fiction goes "there ain't no such thing as a free lunch". There should be a little man at either end of Queen street handing out buttons with these immortal words emblazoned on them in day glow orange. Actually, there's so much day glow on Queen street now as to render this rather less than ideally effective, but the concept is real.

If you are trying to decide between a two thousand dollar computer and a three thousand dollar computer you should bear in mind that there is something that makes the former worth a thousand dollars less than the latter. All of the manufacturers of these things work with the same basic materials and under the same constraints. If one guy is making computers for a whole lot less than everyone else it is reasonable to expect that he's making a whole lot less computer.

This is not necessarily a bad thing. For example, many potential computer owners would rather buy a compatible than an authentic IBM PC. This is a trade off. They'll sacrifice some quality and perhaps some support for some bucks.

Every move down the price stack involves the same trade off. You can work your way all the way down to some really low rent systems which consist of a box, a board and a bag of parts. The solder is extra. These are very good systems... for the right sort of user.

There are very few really bad PC compatibles... there are, however, heaps of them which would make very bad choices for you. If you select the wrong stratum of

the price stack you will either wind up paying more than you have to or getting a system which isn't up to what you need it to do.

Of course, finding your level of hardware isn't easy... nothing with more than two variables ever is, and the problem inherent in choosing a PC juggles several hundred. Much of the solution is lodged in common sense, but, admittedly, you have to know the players.

To begin with, let's divide the available compatibles into two groups, which we'll call "clones" and "work alikes", just like the suits do. These are very hazy classifications, especially as almost all of the people who make what we're going to call the former regard themselves as making the latter.

There is a very good book available called the *IBM Technical Reference* manual. If you were to go out and buy a copy and thereafter sit down with a couple of pieces of acetate and a lot of patience you could very likely design a working motherboard which would do what an IBM PC's motherboard will do. Alternately, one can import any number of motherboards, with or without their components in place, from the far East.

Combine a motherboard with a Taiwanese case and a commercial power supply and keyboard, plug in a BIOS... we'll get to BIOS's in a moment... hang on a drive or two and you have a real working clone. This sort of computer can be made in small quantities and sold on the street extremely cheaply.

Work alikes, on the other hand, tend to be systems which have been designed from the ground up. Characteristically they feature custom cases and features of some sort setting them apart from a real PC. They also usually feature legitimate software bundles. We'll get to that in a moment too.

Your first choice should be between these two bubbling peat bogs of hardware.

Hard Monkeys

Let's start with the clones. Clones are kind of roughish and adventurous sounding, and, more to the point, most people start looking at the low end.

The really cheap clone systems are, to a large extent, of Taiwanese origin. Most are identical in appearance. There are, in fact, two styles of cases currently in use, one with a metal sleeve which slides off from the rear and one with a top cover that lifts off. They're interchangeable... the latter is more convenient if you plan to want to get at your machine frequently.

I tend to regard the really low cost systems... say, under two grand... as being pretty good trips for heads who are up for

hacking with the innards. They're not terribly profound for users who want to regard their systems as black boxes, that is, who just want to run Lotus and ignore the works. None of the ones I've encountered have worked without hitches of some sort.

The types of hitches one runs begin with, there are these BIOS's. A BIOS, at least in PC terminology, is a chip which holds the basic operating system of the computer. It handles a lot of I/O, as well as useful frills like booting the thing.

The BIOS is the thing which IBM holds the meatiest copyright on, and, as such, it's the part of a clone that most dealers get nervous over. This manifests itself in several ways. The most inconvenient situation is the one in which the system is sold *sans* BIOS. They give you a blank EPROM and let you go hustle outside for one. This often involves sending thirty or forty dollars to a post office box and waiting for the arrival of a chip. All told, this is an experience to avoid, as you'll have a few thousand dollars worth of hardware sitting in limbo while the post office trolls bandy your chip about.

The next generation of the BIOS two step uses a sort of legal BIOS which has been re-written somewhat to perform the same functions as the real IBM BIOS. These things go under quite a number of names, including "Super BIOS", "Phoenix BIOS" and so on. Most of them work to a greater or lesser degree, but they all seem to induce some incompatibility with unusual software which wasn't written to allow for BIOS peculiarities.

The outermost ring of the wheel holds those clones which are sold with unlicensed copies of the real IBM BIOS. This may sound like a good trip... if you don't mind the ethics... but there is a catch. If the owners of the BIOS decide to prosecute the heads who are pirating it, you may find that what dealer support might have existed for your machine has suddenly vanished in a puff of legal smoke.

Some BIOS's are custom written for the hardware they're designed to run in. This is probably a good thing... provided they're written well... but there's something to watch out for. In order to run a hard disk a system needs a BIOS that will support it. Not all BIOS's are done this way, and some custom BIOS's aren't available to handle hard drives.

The question of software compatibility is one which should be of paramount concern to any computer user. The easiest way to make a computer which will be largely compatible with software written for a real PC is to make one which is essentially a perfect copy of the blue beast. However, both

The Hitch Hiker's Guide to the Clone Stores

because of BIOS hassles and the need to make substitutions for parts that are hard to obtain there are no practical exact copies. As such, it's hard to be sure just how much compatibility one is buying.

This is, of course, true of the more expensive systems, although the designers of many of these appear to have gone to some effort to ensure that their stuff is largely compatible. Most of the clone machines aren't given particularly thorough tests... if it boots and nothing smells like it's burning send it upstairs.

Rose Power

The clones also come with a wide variety of power supplies, ranging from old Apple style deals right on up to huge hulking monsters which will run your computer and charge the batteries in the family tank at the same time. The power supply, low life device though it may be, is a fairly important consideration.

Unless you intend to buy a single drive system with minimal memory and never expand it you should avoid the system which use Apple type supplies. These are fairly long, thin boxes about the size of a two by four and something less than a foot long. These poor cousins can't really run a PC compatible for any length of time without cooking and becoming strange.

Most of the rest of the supplies one sees will spew out ninety to a hundred and thirty watts continuously. The ninety watt deals will handle a system with two floppies and a hundred and twenty eight K of RAM if you don't plug in anything else that sucks a lot of juice. The larger supplies will smile at a hard drive and lots of peripherals. With the minimal difference in cost between these, the larger power supplies are well worth the spring.

This leads us gently into a field of disk drives. The drives on the less dignified PC compatibles are particularly tricky because there's no real way of being able to tell what you're getting from the outside... you can't always see for sure with the lid off, either. The better systems use Shugart 455's... these tend to be pretty durable, and something you can be proud to jam a disk into. They also cost a lot more than the imitation Shugarts which hover about the sock drawer of technology.

Some of the drives which bear faintly oriental sounding names are unspeakably gross, but, more to the point, are of vastly varying quality. I've come across drives with the same name of which one box worked like it had been personally blessed by God and another which appeared to have been personally stepped on by Godzilla.



Your karma will love you if you hold out for drives by Shugart, Seimens or someone else we've all heard of.

Another really tricky aspect of drives is the number of sides one finds in them. The standard IBM disk format is specified as being double sided double density, which is to say that both sides of the disk are used to hold data. A formatted disk with this format holds a bit less than three hundred and fifty K.

At least one otherwise fairly respectable looking Japanese system comes with single sided drives, each holding a bit less than a hundred and eighty K. Not only does this mean that it won't get as much information to a disk, but, more to the point, it can't use any commercial software which is supplied on double sided disks, as it will be unable to read whatever's on the backs of the disks.

There are a couple of fairly obvious hardware things to check. In comparing the prices of systems you should make sure you know how much memory you're getting, for example. A PC will run with as little as sixty-four K of RAM, but almost none of the useful software available for the system will be at all satisfied with this. A hundred and twenty-eight K is pretty well essential if you're going to use your system as anything other than a conversation piece. A quarter megabyte is a worthwhile thing to have, while multi-tasking systems and some of the more sophisticated applications around demands a half megabyte.

The hardware of some clones and many of the more elite work alikes won't allow for more than two hundred and fifty-six K... check it out if you envision complex programs.

A real IBM PC comes with six ROMs which hold the BIOS and a small version of Microsoft BASIC. The disk BASIC which one normally runs makes calls into these ROMs for some of its functions.

Clones are not usually distributed with the BASIC chips... the clone dealers seem a lot more worried about Microsoft suing them than they are about IBM. There are versions of Microsoft disk BASIC which don't have to make calls into these chips, but some of these are dependant on other quirks of specific hardware, as, in most cases they have been commissioned for specific machines.

As we'll get into, buying a clone pretty well means buying all the software to run on the system. The BASIC can be particularly tricky, as, even if you're prepared to go and pop for it you may not know exactly which version will run on your computer. Getting the wrong BASIC may hang the system, go into the twelfth dimension when you try to use the graphics functions or barf if you attempt to save a file.

Make sure that they guy who sells you the machine has a working version of BASIC for it... and make sure that there isn't a hot set of Microsoft ROMs in the machine he demonstrates it on. Having done this, make sure that Microsoft will sell you a copy of that particular BASIC.

Those ROMs also cause compatibility problems with a small percentage of software, as a few packages use some of the ROM routines they expect to find there. There's not a lot you can do about this, except to try the software you want to run... thoroughly... on the computer you want to buy.

Meandering on, let us speak of keyboards. I don't have a great fondness for IBM type keyboards of any type, but some are, to be sure, a lot grosser than others. Most of the keyboards one finds on clones are made by either Cherry or Maxiswitch. The quality of these things varies considerably over time, but, at the moment, anyway, the Cherry keyboards are really unpleasant, being heavily into static glitches

ALL THE BEST PRICES

HOME COMPUTERS

IBM



AST RESEARCH

Six Pak Plus.....from	\$399.00
Combo Plus II.....from	\$449.00
Mega Plus.....from	\$439.00
I/O Plus.....from	\$219.00

HERCULES

Graphics Card.....	\$525.00
Color Card.....	\$319.00

QUADRAM

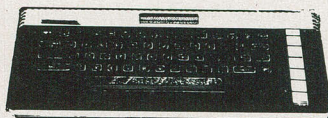
Quadlink 64K.....	\$729.00
Quadboard II.....as low as	\$469.00
Quad 512 Plus.....as low as	\$396.00
Quadcolor I.....	\$219.00
Chronograph.....	\$139.00
Parallel Interface Board.....	\$139.00
64K RAM Chip Kits.....	\$ 49.00

PARADISE

Multi-Display Card.....	\$449.00
Modular Graphics Card.....	\$499.00

TANDON DISK DRIVES

TN100-2.5-1/4" 320K.....	\$239.00
--------------------------	----------



Call for new low pricing

850 Interface.....	\$179.00
1010 Recorder.....	\$ 65.00
1020 Color Printer.....	\$ 89.00
1025 Dot Matrix Printer.....	\$299.00
1027 Letter Quality Printer.....	\$429.00
1030 Direct Connect.....	
Modem.....	\$116.00
1050 Disk Drive.....	\$275.00
64K Memory Module (600).....	\$149.00
CX 30 Paddles.....	\$ 18.00
CX 40 Joystick.....	\$ 12.00



Call for CBM 4 plus

5X-64 Portable.....	\$899.00
Commodore 64.....	\$295.00
C1541 Disk Drive.....	\$335.00
C1530 Data Set.....	\$ 69.00
C1520 Color Printer/Plotters.....	\$212.00
MPS801 Dot Matrix Printer.....	\$299.00
MPS802 Dot Matrix Printer.....	\$399.00
C1702 Color Monitor.....	\$349.00
Joystick.....	\$ 7.99
C1660.....300 Baud Modem.....	\$149.99
Paddles.....	\$ 18.99
Simons Basic.....	\$ 33.00
MCS801 Color Printer.....	\$749.00
DPS1101 Daisy Printer.....	\$735.00
Magic Voice Speech Module.....	\$ 85.00
Desk Organizer w/Lock.....	\$ 69.00
VIDTEX Telecommunications.....	\$ 32.99

MSD DISK DRIVES

MSD1....Single Disk Drive.....	\$429.00
MSD2....Double Disk Drive.....	\$749.00

ASHTON-TATE

Framework.....	\$569.00
dBASE II.....Upgrade.....	\$195.00
dBASE II.....	\$275.00
dBASE III.....	\$599.00
Friday.....	\$279.00

CONTINENTAL SOFTWARE

1st Class Mail/Form Letter.....	\$105.00
Home Accountant Plus.....	\$125.00

IUS

EasyWriter II.....	\$299.00
Easy Speller.....	\$165.00
Easy Filer.....	\$376.00

LOTUS

Symphony.....	\$719.00
Lotus 123.....	\$429.00

MAI

MAI.....	CALL
----------	------

MICROMIM

R:Base 4000.....	\$379.00
------------------	----------

MICROPRO

Wordstar Professional Pack.....	\$498.00
---------------------------------	----------

MICROSOFT

Multiplan.....	\$204.00
----------------	----------

MICROSTUFF

Crosstalk XVI.....	\$155.00
--------------------	----------

MULTIMATE INT.

Multimate.....	\$155.00
----------------	----------

SPI

Open Access.....	\$549.00
------------------	----------

VISICORP

Visicalc IV.....	\$299.00
VisiWord +.....	\$359.00
Optical Mouse.....	\$279.00



CALL WHILE SUPPLIES LAST 800XL, 800XL, 1200XL

7097 Atari Logo.....	\$110.00
4018 Pilot (Home).....	\$ 85.00
8036 Atari Writer.....	\$ 73.00
5049 Visicalc.....	\$118.00
488 Communicator II.....	\$179.00

SWP

ATR8000-16K Z80 CP/M.....	\$590.00
ATR8000-64K Z80 CP/M.....	\$795.00

BIT 3

Full View 80.....	\$349.00
-------------------	----------

ATARI DRIVES

Indus GT.....	\$559.00
Rana 1000.....	\$429.00

KOALA

Koala Pad w/Micro Painter.....	\$ 99.00
--------------------------------	----------

PERSONAL PERIPHERAL

Super Sketch Graphics Pad.....	\$ 61.99
APPLE IIa/IIc/Mac.....	CALL

APPLE

APPLE IIe/IIc/Mac.....CALL

APPLE/FRANKLIN

DISK DRIVES

MICRO SCI

A2.....	\$295.00
A20.....	CALL

RANA

Elite 1.....	\$411.00
Elite 2.....	\$569.00
Elite 3.....	\$829.00

BATTERIES INCLUDED

Paper Clip w/Spell Pack.....	\$ 89.95
The Consultant DBMS.....	\$ 99.99
Bus Card II.....	\$159.99
80 Col Display.....	\$159.99

AXIOM

AT-100 Atari Inter Printer.....	\$295.00
AT-550 Atari Bidirectional.....	\$469.00
AT-700 Atari Color Printer.....	\$699.00
GP-100 Parallel Interface.....	\$277.00
GP-550 Parallel Printer.....	\$395.00

BMC

401 Letter Quality.....	\$899.00
BX-80 Dot Matrix.....	\$395.00

C. ITOH

Gorilla Banana.....	\$219.00
Prowriter 8510P.....	\$498.00
Prowriter 1550P.....	\$879.00
A10 Son of Starwriter 18cps.....	\$849.00
Hot Dot Matrix.....	CALL
F10-40 Starwriter.....	\$1,499.00
F10-55 Pinwriter.....	\$1,999.00

COMREX

ComWriter II Letter Qual.....	\$649.00
-------------------------------	----------

DAISYWRITER

2000.....	\$1,449.00
-----------	------------

DIABLO

620 Letter Quality.....	\$1,449.00
630 Letter Quality.....	\$2,675.00

EPSON

RX-80, RX-80FT, RX-100.....	CALL
LQ1500.....	\$1,695.00
JX-80, FX-80, FX-100.....	CALL

IDS

Prism 80.....for config.....	CALL
Prism 32.....for config.....	CALL

JUKI

6100.....	\$649.00
6300.....	\$1,249.00

MODEMS

ANCHOR

Volksmodem.....	\$ 99.00
Mark VII (A Ans/A Dial).....	\$149.00
Mark XII (1200 Baud).....	\$399.00
9 Volt Power Supply.....	\$ 14.99

HAYES

Smartmodem 300.....	\$344.00
Smartmodem 1200.....	\$748.00
Smartmodem 1200B.....	\$648.00
Micromodem IIe.....	\$412.00
Micromodem 100.....	\$459.00
Smart Com II.....	\$111.00
Chronograph.....	\$299.00

KENSINGTON

Portable Modem.....	\$199.00
---------------------	----------

MONITORS

AMDEK

300 Green.....	\$199.00
300 Amber.....	\$219.00
310 Amber IBM.....	\$249.00
300 Color/Audio.....	\$399.00
500 Color/Comp/RGB/VCR.....	\$639.00

BMC

1202 12" Green.....	\$139.00
1201 Plus Hi-Res 12" Green.....	\$149.00
9191 Plus.....	\$379.00

GORILLA

12" Green.....	\$139.00
12" Amber.....	\$149.00

NAP

12" Amber.....	\$119.00
----------------	----------

NEC

1260 Green.....	\$ 99.00
1205 Amber.....	\$219.00
1215 Composite.....	\$349.00
1216 12" RGB TTL.....	\$649.00
1460 14" RGB.....	\$459.00

PRINCETON GRAPHICS

MAX-12 Amber.....	\$304.00
HX-12 RGB.....	\$749.00
SR-12 RGB.....	\$999.00

MANNESMAN TALLY

160L.....	\$865.00
180L.....	\$1,099.00
Spirit 80.....	\$385.00

OKI DATA

OKIMATE 10.....	\$349.00
82, 83, 84, 92, 93, 2350, 2410.....	CALL

OLYMPIA

Compact 2.....	\$689.00
Compact R0.....	\$729.00
ESW 3000.....	\$2,089.00
Needlepoint.....	\$489.00

PANASONIC

KXP 1090.....	\$359.00
KXP 1091.....	\$459.00
KXP 1092.....	\$659.00
KXP 1093.....	\$999.00

SMITH CORONA

TP-1000.....	\$649.00
Tractor feed.....	\$179.00

SILVER REED

500 Letter Quality.....	\$579.00
550 Letter Quality.....	\$699.00
770 Letter Quality.....	\$1,329.00

STAR

Gemini 10X/I.....	\$389.00
Gemini 15X/I.....	\$589.00
Serial Board.....	\$115.00
Radix 10/I.....	\$849.00
Radix 15/I.....	\$1,027.00

TOSHIBA

1340.....	\$1,169.00
1351.....	\$1,979.00

NOVATION

J-Cat.....	\$149.00
Cat.....	\$199.00
Smart Cat 103.....	\$269.00
Smart Cat 103/212.....	\$599.00
AutoCat.....	\$335.00
212 AutoCat.....	\$829.00
Apple Cat II.....	\$379.00
1200 Hayes Compatible.....	\$516.00
1200b Hayes Compatible.....	\$516.00
Smart Cat Plus.....	\$549.00

ZENITH

ZT-1.....	\$519.00
ZT-10.....	\$489.00
ZT-11.....	\$559.00

SAKATA

SC-100 Color Composit.....	\$396.00
SG-1000 Green.....	\$159.00
SA-1000 Amber.....	\$169.00

TAXAN

TAA12...12" Amber.....	\$199.00
TAG12...12" Green.....	\$189.00
TAG121...IBM Green.....	\$209.00
TAA122...IBM Amber.....	\$219.00
TAC210...RGB/Colour.....	\$399.00
TAC400...Med Res RGB.....	\$489.00
TAC415...Hi-Res RGB.....	\$689.00
TAC420...Hi-Res RGB (IBM).....	\$719.00

USI

PI 1...9" Green.....	\$149.00
PI 2...12" Green.....	\$179.00
PI 3...12" Amber.....	\$195.00
PI 4...9" Amber.....	\$179.00
1400 Color.....	\$419.00

QUADRAM

Quadchrome 8400 Color.....	\$749.00
----------------------------	----------

ZENITH

ZVM 122 Amber.....	\$135.00
ZVM 123 Green.....	\$130.00
ZVM 124-IBM Amber.....	\$229.00
ZVM 135 RGB/Color.....	\$699.00

COMPUTER MAIL ORDER

TELEX 06-218960

= CANADA =

TELEX 06-218960

ONTARIO/QUEBEC

1-800-268-3974

TORONTO

828-0866



(All equipment under full warranty in Canada.)
Price subject to change without notice.
(All orders shipped within 48 hrs. upon payment.)

Dealer Enquiries Invited

Write or telephone for our FREE catalog

Circle No. 23 on Reader Service Card

To order: Send money order, certified cheque, personal cheques must clear our bank, VISA or MASTERCARD. (Include card # and expiry date & signature) Add 5% for shipping and handling. Minimum \$5.00 per order.

Ontario residents add 7% P.S.T.



Computer Mail Order Canada 2505 Dunwin Drive, Unit 3 • Mississauga, Ontario L5L 1T1

The Hitch Hiker's Guide to the Clone Stores

and sending stuff other than the stuff you've typed down the wire. Some of them seem to lock up for no reason. They also feel strange.

Finally, there is the subject of software. Most of the higher priced systems come with software *bundles*. This means that along with the computer you'll get MS-DOS... usually version two... a working BASIC and BASICA or GWBASIC, all the DOS utilities, perhaps WordStar and a spreadsheet and often some custom written programs to play with the machine.

Clones generally offer none of these things, at least, not legally. Many clone places will put two disks in the drives for you when you leave which... lo and behold... contain much of the aforementioned stuff scooped from other systems. However, this is pirated software of the nastiest kind.

Without wishing to get into the heavy ethical pollution of your spiritual essence which this sort of thing is laying on this and future incarnations of your karma, there are several reasons for avoiding this sort of software. Not the least of these is that one never really knows what one is getting, or how well it works, or what has been done to it by the last guy who had it. You may have it up and working and get three months into using it before you find out that it has a bug in it.

Especially if you are planning to use your computer for serious professional applications, finding bugs in the software you're relying on can be devastating. The guy who sold you the computer probably won't even acknowledge that he passed you the stuff, let alone know how to make it work. The companies which produced the software will ask for its serial number, discover that you're someone they don't want anything to do with and fling your hapless soul into the fiery pits of the nether world while they chortle to themselves. You will be completely lost, and, if you're relying on your computer you will find yourself in a very bad space.

Even if you are just buying the system to fiddle with, finding out that it has problems and not having anyone to turn to about them is infuriating.

If you buy software legitimately you'll find that it comes with friendly... un-Xeroxed... manuals and authentic customer support. Unless you are very, very good with a machine language debugger and enjoy using one quite a lot, paid for commercial software is usually worth what it costs. When you consider a clone make sure you figure out what software you need and include its price in your comparison... especially if you're trying to decide between a clone and

a work alike system which comes bundled with everything you'd need.

Grapple Grommets

Amongst their many potential failings, the street level clones, in many cases, lack even the illusion of customer support. This is not true of all of them, but you will do well to check out what sort of help the dealer is willing to render you and, more to the point, what help he can offer. There are quite a number of clone stores with the most cheerful dispositions in the world and no one with any technical ability at all on staff.

Despite the armada of clone dealers around, getting a system repaired is not remarkably easy. Unlike as in the case of the manufacturers of the more expensive systems, which generally have their own service departments or will handle things through a Xerox centre, the clones don't usually come with any sort of defined service arrangement.

More to the point, the place where you bought it might well be a head shop by the time your computer starts taking on aspirations of becoming a paper weight. If you aren't qualified to fix it... and don't know someone who is... make sure you get put onto a reliable looking party capable of handling the repairs before you walk off with the thing.

Clones... especially the funkier low cost ones... cannot be expected to be as reliable as, say, a real PC, and, with the service situation as it is one should consider what long potential down time might mean to one's applications.

If you turn up a compatibility problem in the software you just *have* to run... or a bug which may look like a compatibility problem... you will probably be dead in the water. The dealers of clones are rarely of any help with these sorts of things unless there are lots of other people with the same hassle and one of them finds a solution which he feels like passing on. Even if you own a legal copy of the software, the manufacturer of it can be expected to tell you that it must be your hardware's fault, and that there is nothing he can do. You generally can't even get a refund on the package, as once you break the shrink wrap on those things they're generally yours for life.

If you can afford one of the more expensive work alike systems you will probably wind up a lot happier with it, especially if you are looking for a business system. To be sure, critical functions of a business, such as book keeping and the maintenance of important large databases are probably not well left to a machine that was built in

somebody's basement.

There are a few catches in the more executive computers, however. Unlike as in the case of the clones most of these are not lapses in quality control or design limitations due to the poor availability of a specific quasi-pirated BIOS so much as they are features you might not have counted on.

The first of these is in the nature of the video cards one finds in PC compatibles. They're tricky. If you've had some experience with a clone or a real IBM chances are that you've been looking at the output of a colour graphics card or a reasonable facsimile thereof. This doesn't have to be the case, though. For one thing, there are quite a number of colour cards which, while rarely used in comparison with real IBM cards are, nonetheless, something to look for in the more expensive systems. Most of these things, like the Hercules card, are much nicer to peer at and capable of better things than is the real green slab, but they offer a number of incompatibilities with some software.

Because the PC's BIOS routines to handle the video are very slow, some software drives the card directly. Lotus 1-2-3 is a decent example of this. However, in order to do its thing this sort of software has to know what card it's looking at. Most such packages come with some way to change the cards they'll use... make sure that if you want to run a particular application that it will use the card in the system you're considering.

The monochrome display adapter is a more interesting catch. This is a board which produces a much crisper looking black and white... or black and green... display, but supports no graphics facilities at all. Many systems which are intended for use primarily in business settings come with these things rather than colour cards... the colour card is an option. If you are considering a work alike and want to play with the graphics, then, make sure the graphics are supported.

Some mention should also be made of the ports that come on these systems. There really isn't a lot of standardization as to the I/O facilities you're likely to find on a PC compatible. The most common configuration has one serial and parallel... printer... port out back somewhere. Make sure that, for example, there is a printer port in there somewhere if you intend to render hard copy at some time in the future.

The circuitry for either of these ports... or both, for that matter... isn't really sufficiently involved to occupy a whole peripheral card. As such, when one wants to add a port to a PC compatible one is



generally faced with buying a complete multifunction board for five or six bills... something to make a bit of forethought entirely worthwhile.

As a last word on work alikes, there are a few systems which offer flexible software bundles. This is a very good trip for some users. Under traditional bundling arrangements, one usually gets the operating system, WordStar, perhaps SuperCalc, some sort of database and BASIC. You may not have much use for some of this stuff, in which case part of the cost of your system is going to pay for software you really aren't going to use.

Flexible bundles are usually a decent alternative to this. Rather than a defined collection of software, a system with one of these deals comes with so many dollars worth of credit towards software. You can buy the packages you want.

There is a bit of a catch to this, inasmuch as one rarely gets enough credit under a flexible bundle to buy all the software which would have turned up in a fixed bundle. The bundled software costs the computer companies vastly less than it would cost you if you were to buy it over the counter. As such, they aren't going to give you anything like a credit for the full retail price of it. A fixed bundle is practical if most of the software is applicable to your needs... a flexible one should be considered if you don't want anything in the available fixed bundles.

Finally, it's worth noting that many computer dealers are not quite as dogmatic about their prices as they may want to seem. While it's rarely possible to bargain them down, you may be able to talk a few perks... such as cables, software, a modem and so on... into the transaction. If you tool in with lots of other quotes stuck to your toes they can get really obliging.

Singin' The Blues

No one can figure out which computer you should buy but you. After a bit of research you may not even agree to the latter qualification. Unfortunately, when trying to pin the decision down to a specific chunk of

hardware or even a particular block of financial real estate, one is confronted with a very fine grey scale packed with varying degrees of expensive. The ideal choice rarely leaps at you screaming "buy me".

If you want the ultimate in reliability and support you really should spring for an IBM PC. Everything else is a trade off, but,

unless your Rolls isn't always in the shop, it's probably a fairly attractive one.

In the meantime, you can get these really decent Apple clones down on Queen street too. Actually, you don't have to go all the way downtown. They're in practically every supermarket... in the boxes of corn flakes.

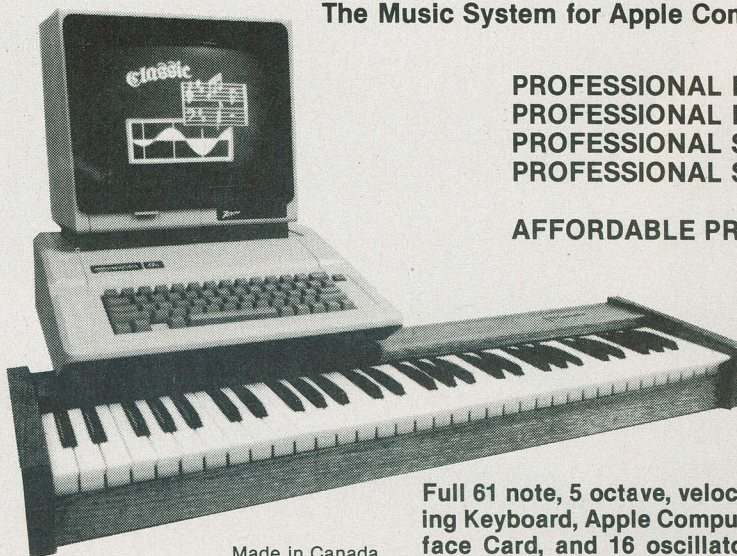
CN!

The Classic System

The Music System for Apple Computers

**PROFESSIONAL FEEL
PROFESSIONAL LOOKS
PROFESSIONAL SIZE
PROFESSIONAL SOUND**

AFFORDABLE PRICE



Made in Canada
Full 1 year warranty

Full 61 note, 5 octave, velocity sensing Keyboard, Apple Computer Interface Card, and 16 oscillator music synthesizer cards. \$1069.

Now available directly from
The Classic Organ Company Ltd.
METATRAK - the 16-track studio recording system.

AlphaPlus - sounds definition program

Simply Music — learn to play the Keyboard the easy way

Music Land - elementary music education, composition, theory and music acoustics.

Sounds Disks — Over 100 instruments and effects on each disk for use with Metatrak, AlphaPlus and Simply Music

The LehrWare Sounds Library — incredible new sounds for your Music System including FM Synthesized effects and real vocal and choral sounds.

METAWAVE — convert sound bases for you ADA or DX-1 emulator card

And more — write for info on the latest software offerings.

The CLASSIC MUSIC SYSTEM — the synthesizer that never grows obsolete.

Completely Compatible with Alpha Syntauri™ and Soundchaser™ software.

'PRO' Studio package or Educational Package
Hardware and Software Complete System
\$1495.

See Complete Review in the September 1984 issue of Computing Now! Magazine.

MIDI PRODUCTS FOR APPLE

Commodore and IBM also in stock
VISA/Master Charge Orders accepted
Call (416) 475-1263

Satisfaction Guaranteed

All Orders Processed within 24 hours
Add 5% for shipping
Ontario residents please add 7% Provincial Tax.

For more information or a list of dealers in your area write:

The Classic Organ Co. Ltd.

300 Don Park. Rd., Unit 12,
Markham, Ontario, Canada L3R 3A1

Circle No. 13 on Reader Service Card

Hewlett Packard Laser Printer



The latest bit of science fiction in printer technology is the introduction of lasers. These unique new page printers have almost unbelievable specifications... and entirely unbelievable prices. Here's a look at the first commercially available model, the Hewlett Packard LaserJet.

by Donald Roy

Hard copy is the final brick wall in the information handling chain. There is something particularly ironic about buying a thirty-two bit computer that can run at some meaningful fraction of the speed of light only to have it wait for a half an hour for its results to be rendered in human readable form.

Despite the latest advances in conventional printer technology, one is still forced to choose between fast ugly printouts and more attractive, and considerably slower ones. Even the more expensive impact type printers don't really offer much digression from this seemingly unavoidable Catch 22.

One usually finds that the solution to a technological treadmill such as this one is some quantum leap forward in the state of the art. This situation is no different... the solution to it lies in the application of that most high tech of gadgets, the laser.

Laser printers, aside from sounding extremely sophisticated, can render workable solutions to a number of printing limitations. While hardly about to replace desk top Epsoms and Geminis in the foreseeable future, laser printers such as the Hewlett Packard machine we'll be looking at in a second offer a whole new world of printer technology for middle and high end users.

Laser Engines

Fundamental to this advance in microcomputer printers is the Canon LBP-CX laser printer engine, a product only sold at the manufacturer's level. This provides the laser

image creation and print functions, along with a case, to which a potential manufacturer must add the laser driver, interface electronics and the other bells and whistles that turn it into a useable printer.

Externally, the engine appears similar to a small photocopier and is, in part, derived from the disposable cartridge technology of Canon's personal copier product line. This differs from conventional photocopiers in that all of the parts that generally wear out, such as the drum, rollers and a toner supply are all contained in a replaceable cartridge.

Instead of using optics to read a document and transfer its image to the mylar drum... the basis of Xerography... the laser drive forms individual characters by interpreting the serial output from the micro and writing the characters on the photoconductive print drum. Toner, or ink, then adheres to the drum and is transferred onto plain paper. The toner is fused to the paper under heat to create a permanent image.

Unlike as in the case of conventional impact printers, a laser printer doesn't appear to do very much when it is initially commanded to print. As a page printer, the laser

must have a full page of information, or have received a form feed signal, prior to physically processing anything.

The Canon engine is supposedly capable of producing eight pages per minute, but software limitations appear to reduce this output somewhat. Operating under WordStar 3.3, the first page of a document appears within about sixty seconds, with subsequent pages appearing at forty second intervals.

Producing spreadsheet printouts from Lotus 1-2-3 proceeds more quickly. Running on an HP 150 micro, with the LaserJet connected to a ninety-six hundred baud serial port, five pages can be printed in about ninety seconds, the first page being ejected after about thirty.

Similarly, software appears to limit the engine's potential three hundred dot per inch resolution in printing graphic images. To use the Lotus graphic functions, the software must be configured for an HP 2674A internal printer. The resulting output is reasonable when block fonts are selected for the titles, but the script and italic fonts are disappointing.

Phasors on Stun

With a suggested list price in excess of five thousand dollars, the HP LaserJet printer is not a bit of hardware that will receive much consideration from casual users. However, in spite of the minor limitations of the system, this technology offers the business user a combination of capabilities not previously available for less than ten thousand dollars.

The quiet operation and letter quality output of the printer are, of course, its principal attributes. The paper handling mechanism will feed plain paper or letterhead from a cassette tray with a capacity of one hundred sheets. Alternately, paper can be fed into the printer manually to allow it to deal with odd sizes of paper, envelopes and overhead transparencies.

The printer won't handle fanfold paper or multipart forms.

The operating guide that comes with the Hewlett Packard printer outlines the realms of escape codes which can be used to control its many print characteristics, as well as code examples in BASIC. Using the setup string option within the print function of Lotus 1-2-3, the printer does what it's supposed to, but the codes must be entered in decimal form.

The change from vertical to horizontal print format requires one escape sequence to select the horizontal orientation, and a second to select the horizontal type font. To produce a really fancy output, at this time,

A PAGE AT A TIME

For seasoned users of dot matrix and da major surprise comes from the fact that the very little once a print command is given. A laser must have a full page of information, form feed signal, prior to physically process full page is available, the HP LaserJet will 55 seconds (under Wordstar), and continue pages at the rate of about 15 seconds each.

Although claimed to be capable of producing spreadsheet printouts from Lotus quickly. Running on an HP-150 micro, with t

A sample of LaserJet print.

requires more coding than many business users will be willing to put up with.

However, the LaserJet also provides a front loading slot for character cartridges. These provide additional fonts in cartridge based ROMs, which are also selected with escape codes. Hewlett Packard currently lists two additional cartridges, one of which will provide compressed print for spreadsheets, bold and italic letters and another for proportional print in normal, bold or italic. There are only two fonts resident in the printer's own ROM; vertical and horizontal versions of the Courier 10 typeface.

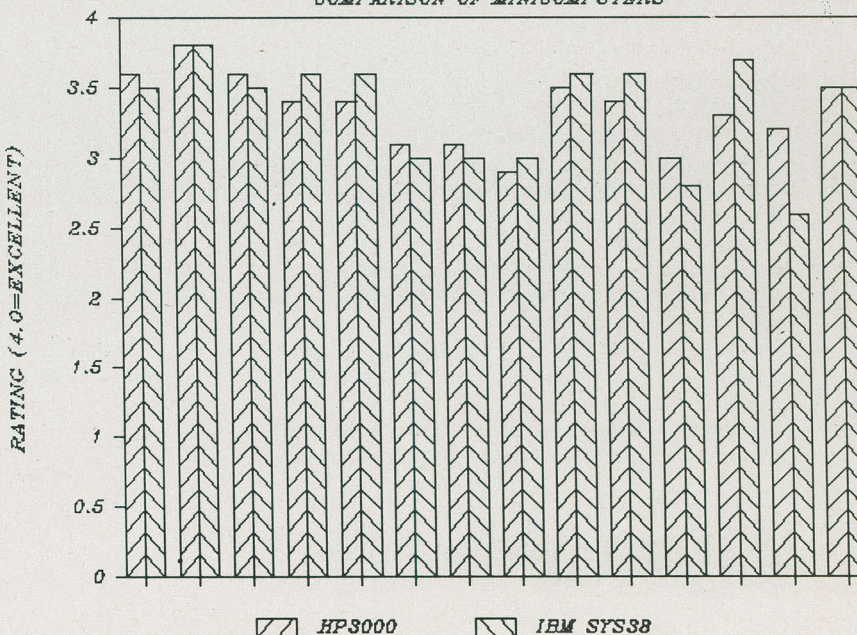
How It Works

The actual operation of a laser printer centres around the synchronous scanning of the print drum by the laser beam. The laser signal is much like a television raster scan, in this case derived from the serial input to the microcomputer.

The beam sweeps the photoconductor drum at a fixed speed, while the drum turns under it. Internally, the laser runs continuously, its beam being modulated by an ultra high frequency stationary wave on a crystal surface. The acoustic wave acts as a lens to transmit or deflect the laser beam.

DATAPRO USERS SURVEY

COMPARISON OF MINICOMPUTERS



THE POWER BROKERS



Broker. By dictionary definition, an intermediary or go-between that, in one or several ways, adds value to a given conveyance.

When the subject is the conveyance of electrical power from a plug in a wall to anything from a computer system to a stereo system, the added value from one of our "go-between" products can be dramatic.

We are DynaTech Computer Power, a company born when two of the industry leaders in power hazard protection and power line conditioning, RKS Industries and Dymarc Industries, joined forces with the technological conglomerate Dynatech Corporation. The result? *The* industry leader in power hazard protection and power line conditioning.

What distinguishes us is not so much that we sell more product than anyone else in our business (although we do), but that we know so much more than anyone else about the business we're in. That we know more problems lurk in power lines than most people realize –

problems ranging from surges and voltage dips to brownouts and blackouts. That we offer a complete line of products to address those problems – from the ClipSpike,[™] ClipStrip,[™] and SurgeSentry,[™] transient suppressors to our new PowerHouse UPS products. That we *design and manufacture* the solutions we sell. And support those products more comprehensively.

Think about it. "Why take a chance?" is the advice you'd probably give your customers about protecting sensitive microprocessor-based equipment from the dangerous eccentricities of electricity. And just maybe it's the advice you should give yourself when considering what line of power hazard protection and power line conditioning products to handle.

"Why take a chance?" Go with the leaders, not the followers. Go with DynaTech. The Power Brokers.

DynaTech
The Power Brokers

Griffco Marketing Inc., P.O. Box 1218, Station B, Mississauga, Ontario L4Y 3W5 (416) 625-6559

Griffco
Griffco Marketing Inc.

ClipStrip, ClipSpike and SurgeSentry are trademarks of DynaTech Computer Power.
Circle No. 24 on Reader Service Card.

Hewlett Packard Laser Printer



Passing through fixed correction optics, the beam bounces off a rotating, multi-sided mirror which provides the sweeping motion directed at the print drum. Where the beam strikes, a static charge on the drum surface is dissipated, creating part of the character or image pixel. Thus, the laser writes the black part of the image, differing from many conventional photocopiers which discharge the white part of the image.

As the print drum rotates over the toner supply, charged particles are attracted to the discharged areas of the surface. When the paper is brought into contact with the drum, the toner is transferred by pressure and subsequently fused to the paper surface by passing the paper under a corona wire. The sheet is then ejected with the print permanently formed on the paper surface.

PRINT

The printer is not a great deal more difficult to set up and use than would be a conventional printer. However, weighing in at seventy pounds it is a good deal heavier.

The LaserJet is compatible with Hewlett Packard microcomputers, of course, as well as the IBM PC and its look-alikes. The printer does not emulate any existing model of printer in particular, so installing software packages that call out specific printers can be a bit tedious. The manual does provide a procedure for configuring the software that will drive the printer at the operating system level.

When it's operating in a small office space, the LaserJet cannot be heard above the noise of other office machines. Its type

quality is virtually independent of variations in its paper texture, which is not usually the case with ink jet printers.

Although developed from the Canon copier technology, the printing cartridges are not interchangeable with those used in the personal copier series. Replacement cartridges are rated for producing three thousand pages in any colour you want, as long as it's black. The toner level can be monitored through a window on one side of the printer housing. As well, the lightness or



Specs

Printer:	LaserJet Printer
Manufacturer:	Hewlett Packard Company, Palo Alto, California
Distributor:	Hewlett Packard Canada Limited, 6877 Goreway Drive, Mississauga, Ontario
List Price:	\$5299.00
Requirements:	Hewlett Packard HP 150, or IBM PC with serial port, and look-alikes.

darkness of the print can be adjusted by an external dial.

Physically, the printer measures about

eighteen inches wide and sixteen inches deep. Since clearance is required on all sides, the practical footprint is quite a bit larger.

The LaserJet is delivered with a manual of over a hundred and fifty pages that is sufficient for the normal operation of the printer in the office environment. Notably, the owners guide is devoid of any technical detail concerning the internal operation of the printer.

The section on controlling print characteristics with escape codes is not well handled. In total, there are sixty different codes available to the user. These may be used to change the fonts and page orientation, transfer raster graphics, set page length and margins, as well as a host of other features. The presentation of this section of the manual, although supported by BASIC language implementation examples, contains no useful structure. The functions are presented and discussed, however a more helpful approach would have been to demonstrate all the coding necessary to achieve a particular end result on the page. The user is left completely alone to figure these out.

Hewlett Packard does provide a toll free line for assistance with this and other microcomputer products, however.

It's also worth pointing out that, while competition among the eventual manufacturers of laser printers will invariably reduce the prices of their supplies, the current hundred and seventy-five dollar cost of a replacement printing cartridge makes the cost of a page of laser printing quite high, at almost six cents a sheet.

CNI

Tandy 1200 Review

Described as the first compatible system to be seriously worrying IBM about their competition, the latest box from Radio Shack offers one a box of powerful hardware, intense compatibility and a really low price.

by Steve Rimmer



As it happens, the first computer we ever bought for this place was a Radio Shack troll. Although its original operating system has long since been reformatted and some of its internal bits changed here and there, that first battered TRS-80 Model II is still largely alive, serving as a word processor and a bulletin board at nights.

The poor one eyed hulk is so loyal it kind of brings tears to your eyes, y'know.

The most recent collection of computers to smile from the windows of Radio Shacks are fairly removed from this plastic behemoth. Gone are the Z80s, pleistocene styrene cases, retinacilling white monitors, TRSDOS... let us praise the almighty creator of life and disks for that one... and most of the other exotica which endeared people to these systems. The latest machines... they don't call them TRS anythings any more... have a new operating system.

Yes it's MS-DOS, the same new operating system that most of the other new computers are springing up with. These most recent introductions from the moguls of Fort Worth are IBM compatibles. We're going to look at one of them, the Tandy 1200 HD, here.

Bubble Packs

The Tandy 1200 is similar to most of the other Tandy PC compatible systems in appearance... there are, at the moment, two of these, the 1000 and the 2000, the latter of which we checked out in the August 1984 edition of Computing Now!. Unlike as in the case of the Tandy 2000, however, the designers of the 1200 HD have endeavoured to build a machine which is as compatible as possible with a real PC.

The 1200 HD is a fairly juicy business machine. It has a single floppy disk and a ten megabyte hard drive. It features a printer port and a monochrome display card. This latter bit is a double edged sword. It allows for extremely crisp resolution for character oriented applications, but the graphics resolution leaves something to be desired, as any attempt to actually display graphics through the thing produces a completely blank screen.

Monochrome cards don't do high resolution graphics even if you threaten them with a hot soldering iron.

Properly installed, Lotus, WordStar and other such packages are extremely nice under the 1200. Things like AutoCad and any games you may have taped to the underside of your desk drawer are depressingly useless. A colour card is available for the system as an option.

As far as I was able to tell, the system is about as PC compatible as a computer can be without being born wearing a grey suit. Excluding the aforementioned graphics based software there was nothing that wouldn't run properly on the Tandy 1200 HD. The hard drive made everything that accessed the disk at all extremely fast.

It also made everything extremely quiet. If you turn off the television, anesthetize the dog for a while and run nothing but the computer you'll think you've gone deaf. The cooling fan is all but silent, the hard drive completely so... even the keyboard doesn't seem to make much noise. It would be perfect for handling word processing during a funeral, for example, although it's my understanding that very few people do this sort of thing.

Greenies

Upon first turning the system on, one notices two of its fairly obvious features... one each bad and good. Unlike many systems which support hard disks, the Tandy 1200 has a "smart" BIOS. It will attempt to boot from the floppy but, if one isn't in place, it will start up on the system on the hard drive. As such, one doesn't really need the floppy drive in regular use, except to back up data and to get new software into the system.

When the computer first comes on line the screen lights up looking like the crispest, most pleasant looking green tube on the planet. It is, too, until any of the text on the screen moves. Unfortunately the manufacturers of the associated monitor seem to have scored the phosphor from the boys who build radar displays. It has an annoyingly long persistence... clearing the screen, or moving any part of it, leaves an afterimage which hangs around for as long as thirty seconds.

You can get used to this, but it's still a bit irritating.

Ignoring the monitor hassle, the Tandy 1200 HD was flawless in operation. Both drives worked perfectly without a single glitch in the whole time I had the machine. The computer never hung once, despite its running most of the time on ghastly rural power, which is often more noise than sine wave. It also exhibited no peculiarities, even when it was running benchmarks which I've deliberately written to misbehave on clones.

Even the keyboard was manageable. It appears to have been a Maxi-Switch trip, or a copy of one. It had a good, stiff feel to it and didn't static out or start redefining the characters for you. The connector on the one I used... or perhaps the keyboard jack on the motherboard... was a bit funky, and occasionally worked itself loose.

The system was, in a functional sense, a real IBM with a much lower price tag.

The software bundle which comes with the Tandy 1200 is unusually small, consisting only of MS-DOS version two, BASIC and BASICA. There's nothing particularly wrong with this, as one pays for bundled software whether one uses it or not. I would imagine that many users who consider systems like the 1200 do so with specific applications in mind, such as accounting or record keeping. As such, you'll probably want to choose your own software in any case.

The BASICs which come with the system work admirably well. They consist, in fact, of a single BASIC.EXE file and two very small COM files which set things up and chain to it. This saves forty or fifty K of



Specs

System:	Tandy 1200 HD
Application:	Business computer
Operating System:	MS-DOS 2.11
Memory:	256K
Mass Storage:	One 360K floppy, one 10 MB hard drive
Processor:	Intel 8088
Software Included:	MS-DOS 2.11, BASIC, BASICA
Software Available:	IBM-PC compatible software
Manufacturer:	Tandy Electronics Limited
Distributor:	Radio Shack computer centres
Suggested Retail Price:	\$4499.00

disk space, although if you get down to the point where forty or fifty K makes a difference on a hard drive you probably aren't killing your BAK files quite as often as you should.

The BASICA package supports all the MS-DOS graphic drivers, so if one were to buy a colour card for the beast at a later time it could be run through the existing BASIC.

By the Book

About the only other thing which one finds stashed in the Tandy 1200's voluminous packing case is a boxed set of two manuals, one for BASIC and one for MS-DOS. These appear to be pretty standard Microsoft style tomes. Like most similar documentation, they're written for somewhat experienced users. They tell you all sorts of things about files and directories but, if you don't know what a file or a directory is, you'll probably need another book.

Section 1.3 for example, asks "Why is MS-DOS so important?". It also answers this pregnant question. "All Microsoft languages (BASIC Interpreter, BASIC Compiler, FORTRAN, COBOL, PASCAL) are available under MS-DOS." This is followed by a large expanse of blank page, which could presumably be used to write down the names of other Microsoft languages if any turn up, or, for that matter, anything else one wished to commit to paper. Paper is very flexible.

An odd set of priorities, this, for a system whose eventual owners will probably never even hear of FORTRAN unless they check out section 1.3. However, it's arguably better than "because all the IBM PC clones use it."

Once one gets over the initial learning curve, the books which come with the system make really decent reference manuals.

Of the seeming shaggy hordes of MS-DOS based systems which have paraded through here in the past couple of months, the Tandy 1200 is certainly among the best for what it does. It's easily available, and from a company that will most likely be around to service it. This is important, to be sure. Radio Shack still provides service for our ancient Model IIs, which is more than one could say about the manufacturers of most other systems made at the same time.

The system is also happy with all manner of software and, as such, allows its users to run virtually anything they fancy on it. It seems to be admirably well constructed, and at least reasonably well documented. Its glitches, such as its tube, are few and comparatively minor.

Actually, I did up a couple of fairly good games for that tube... all the aliens had these really decent art nouveau comet tails wherever they went, which was actually fairly slick looking. It also allows for fairly realistic looking explosions... although the blasts themselves, being limited to cataclysms of smiling face characters, lacked the sense of awe inspiring doom that more sophisticated graphics might have inspired.

There are, to be sure, better games machines. **CNI!**

Circle No. 60 on Reader Service Card.

Fresh Apples



Every so often Apple Canada comes up with a new disguise for one of its press conferences, invites everyone over and announces some new toys. This one was no exception.

by Frank Lenk

On the twenty-third of January, Apple Canada threw what it called a birthday party for the Macintosh. They've come to realize that the attendance at press conferences is eminently better when they're couched in something that promises free eats. However, like most press conferences, this one was largely couched in corporate motives. It was to be Apple's vehicle for announcing a number of new products, both from its own stables and from third party suppliers.

The most important single item came not from Apple itself, but from Lotus Corporation... which is about to launch what promises to be the most important piece of software ever offered for the Mac, Lotus Jazz.

Apple itself has moved ahead with its marketing approach to the Mac, shifting emphasis upward from single users to attempt to infiltrate small to medium sized

business. In line with this move, the company has introduced two pieces of hardware; a networking connection for the Mac, and a letter quality laser printer.

These may seem like reasonably important developments. Even so, their importance does nothing to suggest the sort of circus that Apple put together to announce them. Imagine, if you will, sitting through a video presentation summarizing the history of Apple Computers, from a blue jeaned Steve Wozniak to the glistening Mac, all done in ultra fast intercutting of still photos, played to the tune of "Hold on Tight to Your Dreams"... the same tune used in those unbelievable coffee achiever ads on television. You might then want to imagine a young executive type announcing that "1984 was the year of event marketing" for Apple Computer.

The events included the controversial 1984 commercial on television, which

showed a female athlete wearing a Mac T shirt doing battle against sterile Orwellian society. They also included the incredibly expensive buying out of all the advertising in Newsweek's special election issue, and the subsequent special distribution of the issue as an insert in the Toronto Globe and Mail newspaper. This was called "a bold corporate move" by the Apple spokesman.

Fruitful Year

Interspersed among all the superlatives were some truly inspiring facts. In 1984, Apple //e sales were still big time stuff... over two hundred thousand computers were sold for Christmas, with the Canadian Christmas sales more than doubling those of the previous year. These positive results were attributed to "the most aggressive Canadian-made print and television advertising campaign to date."

The bottom line was total sales of over

XEROX* Service Centres

OFFER MORE THAN RELIABLE SERVICE

A LIMITED TIME OFFER FROM XEROX SERVICE CENTRES

- 15% discount on service contracts
- Free equipment inspection (Depot Only)
- Free box of 5-1/4" diskettes with the purchase of a Xerox Maintenance Agreement on supported micro computers.
(Minimum purchase of \$300.00)
- Offer expires April 15th, 1985



The above offer cannot be used in conjunction with any other promotion, offer or volume discount pricing.

Available at:

DARTMOUTH

24 Simmonds Drive
Nova Scotia B3B 1R3
(902) 465-2899

MONTREAL

3542 Ashby
Ville St. Laurent
P.Q. H4R 2C1
(514) 337-0502

QUEBEC CITY

1990 Blvd. Charest, Ste. Foy
P.Q. G1N 4K8
(418) 687-2759

OTTAWA

1685 Russell Rd.
Ontario K1G 0N1
(613) 526-1000

TORONTO

265 Yorkland Blvd.
Ontario M2J 1R5
(416) 499-9700

BURLINGTON

2289 Fairview St.
Fairview Bus. Park
Burlington, Ontario
(416) 632-1741

LONDON

98 Bessemer Court
Ontario N6E 1K7
(519) 681-197

WINNIPEG

#1-1393 Border Street
Manitoba R3H 0N1
(204) 632-5340

SASKATOON

#4-401 Pakwa Place
Saskatchewan S7L 6A3
(306) 934-7000

CALGARY

2720-12th Street N.E.
Alberta T2E 7N4
(403) 250-3556

EDMONTON

#428-8170-50th Street
Alberta T6B 1E6
(403) 466-1251

VANCOUVER

1770 Burrard Street, Suite #104
B.C. V6J 3G7
(604) 736-8931

VICTORIA

3382 Burns Avenue
Victoria, B.C. V8Z 3P2
(604) 382-3123

XEROX SERVICE CENTRE MAINTENANCE AGREEMENT

MICROCOMPUTERS

IBM, APPLE, KAYPRO, HYPERION AJILE,
OSBORNE, COMPAQ, ALTOS, CORONA,
FRANKLIN, MORROW, NEC, OLIVETTI, COM-
PUPRO, S.T.M.

PERIPHERALS

OKIDATA, NEC, JUKI, AMDEK, C. ITOH, EPSON,
DIABLO, PRINCETON, TALLGRASS, TEO,
TOSHIBA, UCHIDA, ZENITH.

CONTRACT #

VALID

THRU

XEROX SERVICE CENTRE MAINTENANCE AGREEMENT DISCOUNT COUPON — 15%

Expires April 15th, 1985

Customer Name _____

Contact Name _____

Address _____

Phone _____

Product Types _____

Present this coupon to your nearest Xerox Service Centre to
receive your discount. CN 385

*Xerox is a registered trade mark of Xerox Corporation used by Xerox Canada Inc. as a registered user.

Circle No. 35 on Reader Service Card

Fresh Apples

one and a half billion dollars, up fifty-two percent from the previous record of under a billion.

"In 1984 Apple Canada stood up and was counted in the public affairs arena." The company went before the courts to protect itself against the "so-called Apple clones." Globally, Apple had two victories to report, against Franklin in the United States and against Wombat in Australia.

Apparently 1984 was also the year that Apple Canada chose to "speak out against the Copyright Act... an antiquated piece of legislation that is preventing this country from becoming a world class player in the international software arena." By the way, "you can expect more from Apple Canada on this issue in the months to come."

Two new Apple //c products were announced in passing. The long heralded LCD flatscreen display is supposed to be "in dealer's showrooms" by mid February. There will also be a new bilingual French and English //c designed specifically for Canadian use.

MacNews

Perhaps the most interesting bit of Mac gossip was the news of a major price cut on the Macintosh. The Fat Mac is dropping from \$4795 to \$4095 Canadian, and the upgrade from 128K Mac to Fat Mac will decline from \$1500 to \$950, partly owing to price reductions for the 256K RAM chips.

Before getting down to the real nitty gritty product introductions, Apple felt called upon to answer the burning question "where's the software?", as posed by a slide of that sweet old Wendy's lady, Clara Peller.

It was stated that Apple "is not and will not be a large scale software developer". However, Apple supports developers at several levels. First and most numerous are the small independent producers. These have access to technical documentation such as the publication *Inside Macintosh*.

Next up are the certified developers. These parties get documentation as well as product discounts, phone assistance, newsletters, advance product information and invitations to workshops and conferences. Much more rarely, Apple will enter into co-marketing of software products. This happened in advance of the //c introduction, and allowed Apple to provide a software sampler to launch the machine on its way. Co-labelling, the final option, is very rarely invoked. However, a prominent Canadian example of co-labelling involves LCSi, in Lachine, Quebec, which developed Apple LOGO.

A number of Macintosh products are

soon to debut from Canadian sources. These include MacDoc, a medical billing system, a stock charting system called CSL Stock Charter, a data manager inevitably entitled MacBase, a lawyer's package called LegalWare, and a manufacturing control system called Embroidery Plus.

Apple went to great lengths to assure everyone that not only was there lots of great stuff you could do with a Mac, there were lots of great people out there doing this stuff. A film strip presented everyone from the Toronto Globe and Mail to freelance writers as having fallen madly in love with the Mac. Oddly enough, one of these case history subjects was later heard to remark that a major project had been held up for months owing to unavailability of Microsoft Word. Still, all that's in the past now that there are "over three hundred" software products available for the Mac.

Mac Software

Probably the single most important aspect of the whole circus was the display of a beta copy of Lotus Corp's new *Jazz* software. In marked contrast to the Apple crew, the fellow from Lotus seemed almost shy as he sat in a corner with only a Mac for company.

Jazz looks phenomenal. Compared to all the previous Mac software, it seems to run faster, get to the point quicker, yet apply the friendly graphics environment more completely. Compared to previous Lotus offerings, *Jazz* looks jet propelled.

It makes *Symphony* look like cacophony.

Written from the ground up for the Mac, *Jazz* offers a spreadsheet of up to two hundred and fifty-six columns by almost nineteen hundred rows and integrates four more functions besides. It handles word processing, data management, forms, communications and graphics. In short, it does everything that *Symphony* was supposed to do... only it seems to do it well. The spreadsheet menu bar offers windows, tools, range, font and style options. The latter two let the user blow the view window up from nine point to thirty-six point type. All the calculating options of 1-2-3 and *Symphony* are included.

The graphics package offers similar power. Its display options include line, bar, overlapped bar and other types of charts. Once created, the charts can be manipulated in ways that will make IBM owners cringe. You can flip the chart diagonally, switching to a horizontal rather than vertical display. You can choose from twenty-four fill patterns and about the same

number of line types. You can add text in all the usual Mac fonts and sizes. You can even add arrow pointers.

Perhaps most marvelous of all, when you shrink the active graphic window to look back at your spreadsheet, the graph shrinks too... so you can always see your complete chart as you work on the figures.

The word processor seems to be more powerful than Apple's own MacWrite. It can do all the usual search and replace, move and copy stuff, plus justify, zoom edit and so forth. Furthermore, there's an option called *hot views*, which lets you paste in a dynamic image from another application. For instance, you can insert an image of your chart from the graphics application. Shrink the window a bit, go back to fiddling with the numbers in your spreadsheet, and you'll see that the chart changes to match what you're doing.

This function also lets you paste in database information, or even the Mac's own date and time readouts.

The database, unfortunately, looks a lot like that in *Symphony*. That is, the data is entered in what is essentially a spreadsheet layout. Still, the forms painting and complex searching and reporting features should make this application quite functional... although perhaps not a rival for dedicated systems.

The communications option is also a bit limited compared to single use systems.



BUDGETRON INC.

IMPORTER/DISTRIBUTOR

1601 Matheson Blvd., Unit 3, Mississauga, Ontario L4W 1H9 Tel: (416) 624-7323 Telex: 06-960172

DEALERS/OEM's ... come to the SOURCE for:

New

Model
CPS-1130M



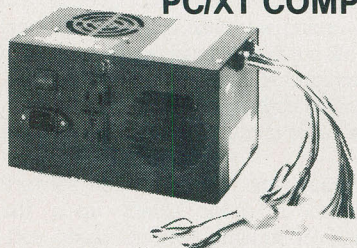
★ CSA PENDING ★ 130 WATT SIDE SWITCHING POWER SUPPLY

- Upgrade IBM™ PC & XT at Lower Cost Now!
- Direct Replacement for IBM™ 63.5 Watt.

Model	Rating	Output			
		+5V	+12V	-12V	-5V
CPS-1130M	130W	15A	4.3A	0.5A	0.5A

- Two (2) IBM™ Type Power Connectors to PC Mother Board.
- Fits our PC/XT Side Switch Case.

BACK SWITCH POWER SUPPLIES FOR PC/XT COMPATIBLES



MODEL CPS-1130
CSA PENDING

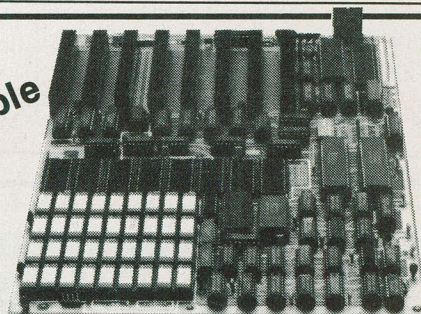
Model	Rating	Output			
		+5V	+12V	-12V	-5V
CPS-1100	100W	10A	3.5A	0.5A	0.5A
CPS-1130	1300W	15A	4.3A	0.5A	0.5A

IBM™ COMPATIBLE PERIPHERAL CARDS

- Floppy Drive Controller with Cable • Ram Card • Multifunction • Parallel • Serial • Colour Graphics • Monochrome • Monochrome Graphics with Parallel

IBM is a Registered Trade Mark of IBM Canada Ltd.

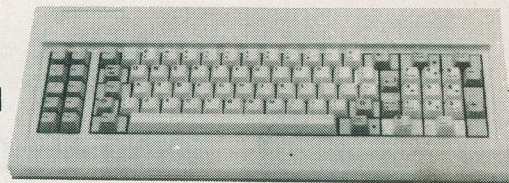
Very Reliable



8 Slots XT Compatible Mother Board

- Fully IBM PC/XT Compatible
- Supports PC DOS, MS DOS, and CP/M 86
- 256K of parity checked RAM
- 8 expansion slots
- Double sided board 8-1/2" x 12" exact fit to our cases.
- All new components/No Bios

Unitech K-150 Keyboard



IBM™ PC/XT PLUG COMPATIBLE

- Uses German made Cherry Keyswitches.
- Call for Special March Prices.

Shugart SA455

- 5-1/4"
- 1/2 Height
- DSDD
- 360K

*Fits IBM™ PC, XT, Portable & PC Jr. *

10 MB 1/2 Height Hard Disk Subsystem

8 SLOT CASES

PC/XT Case

Exact fit to our 100/130W Back Switch Power Supplies

PC/XT Case

Exact fit to our 130W Sides Switch Power Supply

IN-HOUSE TECHNICAL SUPPORT 90 DAY WARRANTY ON ALL PRODUCTS

CALL (416) 624-7323

Fresh Apples

There is no automatic logon macro option, for instance. Still, all the other options... like baud rates, parity, and so on... are there. It even looks as though the user will be able to configure the program to receive 1-2-3 or similar data and have it automatically reformatted directly into the *Jazz* spreadsheet.

All of the functions appeared to work

amazingly fast. The disk access is minimized by a crafty scheme of downloading just those parts of the program that you'll want to use in any particular phase of operations. The whole thing gives the impression of being somehow peppier than a lot of the rather lethargic software previously seen on the Mac.

The expected retail price will be just under six hundred dollars American. The hardware demands are a bit stiffer. *Jazz* will only run on a 512K Fat Mac with two disk drives.

It's true that the version of *Jazz* that was displayed at Apple's press conference was only preliminary, with the package's commercial introduction expected only at the end of the first quarter of this year. Still, if *Jazz* really is as good as it looked there might be many a spreadsheet user who'd want to pass up the PC for the sake of a loaded Mac.

Mac Hardware

A number of new pieces of hardware... some introduced and some promised for later this year... are woven into Apple's overall strategy for the Mac. Much of it concerns what Apple has called "the Macintosh office."

Based on the assumption that workers spend much of their time in close communication with members of a "work group", Apple has created the *AppleTalk* personal network.

The most unusual thing about the *AppleTalk* network is its price. It costs eighty dollars per station. This compares rather favorably with the one thousand dollars or so that it takes to connect an IBM type PC to a network. The saving arises mainly because the Mac already has a good deal of the networking workings built in. Additional *AppleTalk* hardware consists of a cable with a little matchbox-sized case in it. Connection involves nothing more tricky than plugging the cable into a port at the back of the Mac.

Naturally, the utility of this network depends to a great extent upon the availability of suitable network based software. Apple stated that "leading companies, such as 3Com Corporation, Sytek Incorporated and Hayes Microcomputer Products Incorporated are already working on products for *AppleTalk*."

The other major piece of hardware introduced at the press conference was the *LaserWriter* printer. There has been a good deal of complaining going on about the lack of a letter quality printer for the Mac. Apple has filled the void with a vengeance. The printer demonstrated at the press conference was easily able to reproduce the Mac's mixture of text fonts and graphics with a print quality somewhat like that of the average offset printing run. Its resolution of three hundred dots per inch results in perfect letter quality, plus sharply detailed graphics, with blacks so black they look like they've been hand painted with india ink.

Software Supply

127 Manville Rd., Suite 202, Scarborough, Ont. M1L 4J7
Phone: (416) 759-2636 or (toll free) 1-800-387-4560

**THE ONLY PLACE YOU NEED
TO CALL FOR:**

Lotus

Business
Educational

**WORDSTAR
2000**

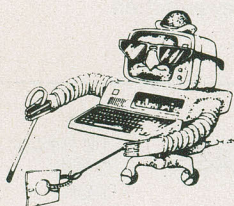
VISICORP®

or
Entertainment
Software

MICROSOFT.

**CBS
SOFTWARE**

FOR YOUR:



IBM PC/XT or AT
and Compatible
Apple II/II+//IIe/IIc
or Macintosh
Commodore 16 or 64



and many more, too numerous to mention

CALL TODAY — 759-2636

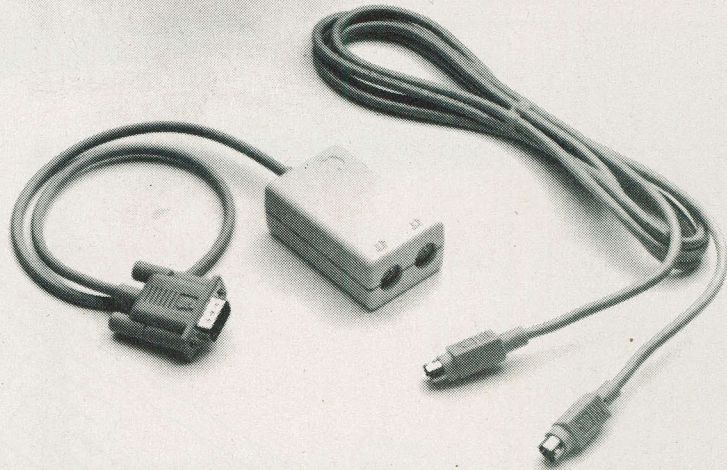
for our March Specials or

a copy of our **latest** software catalogue.



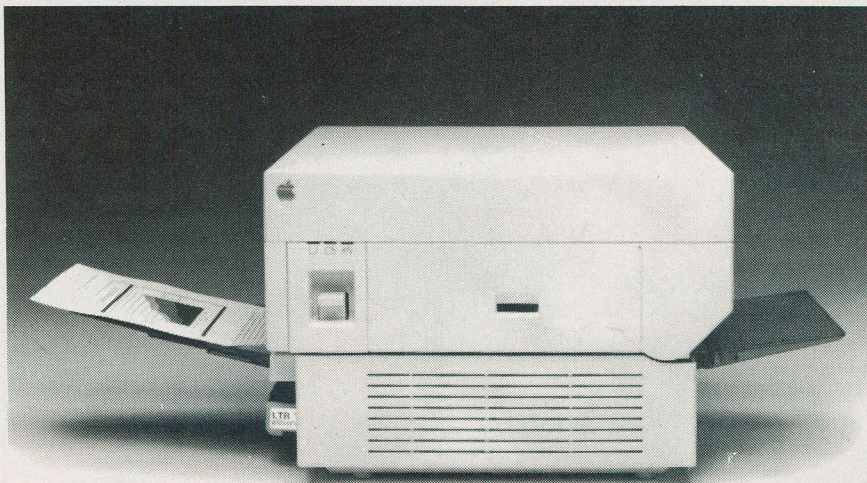
DEALER INQUIRIES WELCOME

Lotus is a registered trademark of Lotus Development Corporation. WORDSTAR 2000 is a trademark of MicroPro International Corporation. VISICORP is a trademark of VsiCorp. MICROSOFT is a registered trademark of Microsoft Corporation. CBS Software is a Unit of CBS, Inc. SORCIMIUS is a trademark of the Sorcim IUS Micro Software a division of Computer Associates International, Inc. IBM PC/XT and AT are registered trademarks of International Business Machines Corporation. Apple II/II+//IIe/IIc are registered trademarks and Macintosh is a trademark licensed to Apple Computer, Inc. Commodore 16 and 64 are registered trademarks of Commodore Business Machines Ltd.



The components of AppleTalk

The Apple LaserWriter printer



Further marvels reside within the Laser-Printer. The thing contains what Apple terms the most powerful computer it has ever built, based on a twelve megahertz 68000 processor programed in a page description language known as PostScript, drawing on a half megabyte of ROM plus a megabyte and a half of RAM. A built in program will emulate the Diablo 630 daisywheel printer, allowing even IBM PCs to use the printer... albeit without Mac's fancy fontwork. The LaserWriter is built around the same Canon LBP CX10 laser engine used in Hewlett Packard's LaserJet printer described elsewhere in this issue.

Alas, LaserWriter bears the onerous price tag of almost eleven grand Canadian. Although this makes it ill suited to impulse buying, Apple is figuring that network users will be able to justify the price on a per Mac basis. Each printer has AppleTalk built in, and can be shared by up to thirty-one network users.

The PostScript language apparently stores fonts as mathematical formulae,

known as *outlines*, rather than as a bit map. These outlines can be used to generate the typeface in any size or orientation. PostScript is also able to handle high resolution graphics... higher resolution than the Mac itself.

Apple noted that that LaserWriter is "the first personal computer printer to be awarded license to use the original *Helvetica* and *Times* typefaces", something which probably won't mean a lot to most users... although it impressed everyone around the typesetter at the office to some extent. Furthermore, Mergenthaler Linotype, "the largest phototypesetter manufacturer in the world", will be introducing a line of AppleTalk and PostScript compatible typesetting machines, with resolution of over twenty-five hundred lines per inch.

More Macintosh hardware will be introduced throughout the year. Due out later this summer is a file server. This box will provide twenty megabytes of storage, internally expandable to forty. For the fall, there's a set of three interface cards. The

AppleTalk PC Card will allow IBMs to hook up to the AppleTalk network. The Gateway card will do the opposite, allowing Macs to get in on PC Net. For the real fanatics, AppleLine 3270 will permit Macs to communicate with IBM mainframe installations.

At the Core

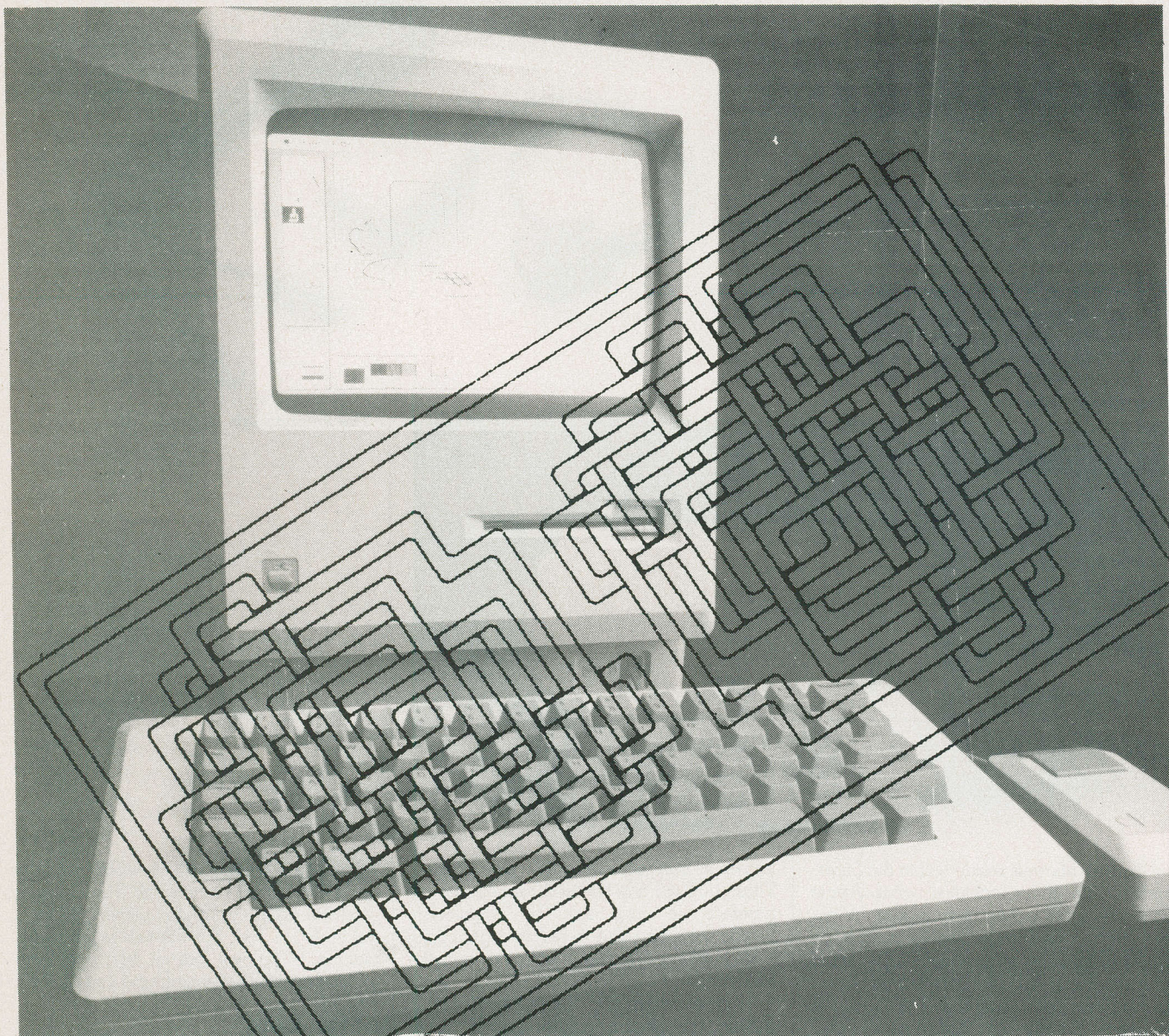
There is something of a sense of loss in all this. The tone of the press conference was that Apple was burying the last of its faded Levis and hustling downtown to be fitted for some good corporate grey three piece suits. They were setting up to out IBM IBM.

While Apple may well succeed in snatching a chunk of the business market for itself, its vestiges of being a group of smiling grassroots human beings are probably entirely whisps of nostalgia by now. It may wind up alienating the people who started out buying Apple computers.

The gloves are off, and Apple's new hard sell almost makes IBM look like a philanthropic institution.

CNI

Technical Drawing on the Mac



The creation of reasonable looking technical drawings is a labour at best. Providing that your requirements are fairly modest and your forethought fairly well to the fore you can do some types of drafting on the Mac of all trades.

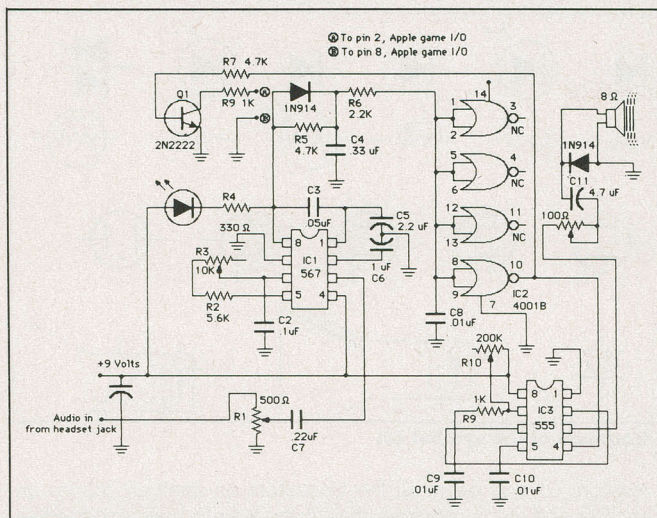
by Steve Rimmer

Perhaps more so than with any other system, the real potentials of the Macintosh and its applications aren't totally apparent until you've had the thing kicking around for a while. To begin with, while very easy to get into, true mastery of the Mac's software takes quite a handful of hours.

There are probably few Macintosh owners who don't eventually wind up turning the box to tasks they never even thought of using it for when they acquired it. Much of this flexibility is the result of a lot of forethought that's gone into the applications.

The potentials of MacPaint are particularly inspiring. One can sit for hours doing things like the lead image for this article. However, perhaps more promising still is the possibility of doing productive work on the little guy... which, if you can tear yourself away from trying to render Da Vinci in fatbits, is really worth pursuing.

This article will have a look at the potentials in MacPaint for doing technical drawings. While this package is by no means the equivalent of a complete CAD system, its possibilities are surprisingly good... if you go at it with a bit of forethought.



This is a drawing done on the MAC. It's been shot down about sixty percent.

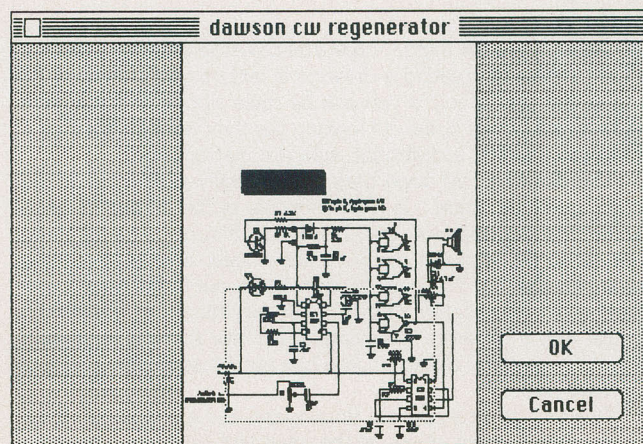
Five Thought

Depending upon what you want to technically draw, the MacPaint package can be adequate or fairly brilliant. Electronic schematics are a task of average difficulty, and, as such, we'll use them for this example.

There are a few things about MacPaint which are important to realize in trying to do these sorts of tasks on it. To begin with, it consists of a window over a larger... but finite... worksheet. This means that, while you have more working room to play with than there would initially appear to be, you can't just go on forever. More sophisticated drawing software allows for an infinite virtual worksheet by using the disk as virtual RAM.

This, in turn, puts definite size restrictions on the drawings one can manage on a single MacPaint work sheet. While not trivial, you shouldn't plan to lay out a new shopping centre on the thing... at least not in any detail.

It's also worth noting that scrolling the screen window about the larger sheet area requires disk accesses and, as such, a wait of a few seconds.



This is the drawing within the MacPaint worksheet.

The biggest restriction inherent in this sheet, however, is the tendency to paint one's self into a corner. Even if you are working on a drawing which will theoretically fit in the available space, you have to start it in such a way that part of it doesn't try to draw itself off the page. The boundaries are immovable brick walls.

None of this is in the least bit uncool... so long as you are aware of it and plan accordingly.

Most sorts of technical drawings utilize symbols of some sort... electronic schematics being very little else. Symbols are not MacPaint's forte. Unlike some other drafting software that lets you define symbols and pop them in where you want 'em, MacPaint wants to treat small areas of pixels in a fairly cumbersome way, moving them from the scrapbook to the clipboard to the work sheet every time you want to lay one down.

Once again, careful planning can get you around this limitation.

There is one feature of MacPaint which is invaluable in doing these sorts of pictures. The *grid* function of the goodies menu allows you to toggle on and off the placement of an invisible grid over the worksheet. With the grid activated, moving the line cursor and dragging anything will cause all the action to hop around eight pixels at a time. This makes placing things so that they wind up looking like they're supposed to be there a great deal easier than it might have been freehand. It also makes creating at least the illusion of symbols a much better trip.

Electronic Symbols for the Macintosh

The most complex aspect of doing electronic schematics on the Mac is designing the symbols. Your fatbits will love you if you acquire a copy of our symbol set. These little trolls took us several eons to create, but, having done so they're a very well designed, complete set of circuit components.

The set includes two pages of symbols, one each for analog and digital circuitry. The former has capacitors, various resistors, diodes, silicon controlled rectifiers, thyristors, LEDs, rectifier bridges, transistors, a number of transducers, field effect devices, inductors and even vacuum tubes for those situations where you find yourself in a time warp. The digital sheet includes a complete set of logic devices and integrated circuits.

This package will be useful on any Macintosh computer having a hundred and twenty-eight K of RAM or more, an Imagewriter printer and the MacPaint application.

It costs

\$29.95

Ontario Residents add 7% P.S.T.

Computing Now! Software
25 Overlea Boulevard, Suite 601
Toronto, Ontario
M4H 1B1

Phone orders and major credit cards accepted

Fine Print This symbol set is copyright © 1985 Steve Rimmer, and is not placed in the public domain. It is not copy protected. It is sold on the basis that it may be duplicated and used by the original purchaser only. The purchaser is authorized to distribute printouts of portions of the set, but not to distribute machine readable files which contain any portion of the set.

This disk is shipped without an operating system and without the MacPaint software, both of which are the property of Apple Computer Incorporated.

Technical Drawing on the Mac

Having the grid function activated transforms MacPaint from a kind of interesting way to do freehand pictures to a moderately powerful electronic drafting table. However, it makes the design of the things you'll be laying down on that table pretty tricky.

Diodes

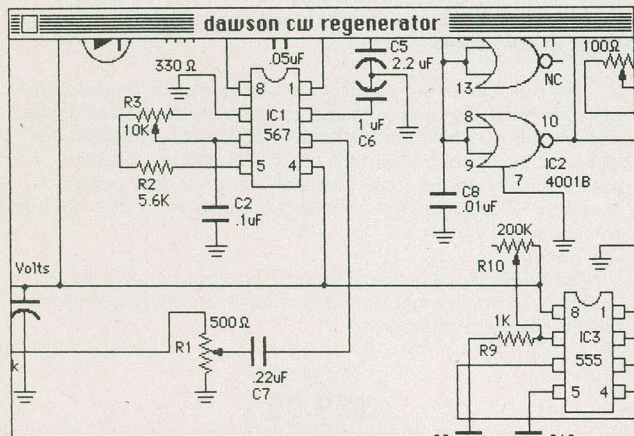
Electronic symbols... and, in fact, most of the shapes one uses in any sort of mechanical drawing... are too complex to simply draw them wherever one wants them on the worksheet. If you plan to handle a drawing of any scope, you'll want to create a set of symbols beforehand, copying them into place as you need them.

The drawings which I've used in this feature were done from a set of symbols I set up for general electronic drafting. The drawings took a couple of hours... creating the symbol set required about three days.

There are a number of considerations in doing up a symbol set which may not be immediately apparent. To begin with, aesthetics require that the proportions of the individual symbols be considered. In the case of these schematic bits, having the diodes larger than the transistors, for example, would look kind of gross.

A more relevant consideration concerns the use of the grid. The spacing of the increments of the grid are not adjustable. As such, the symbols must be designed to fit it, rather than the other way around.

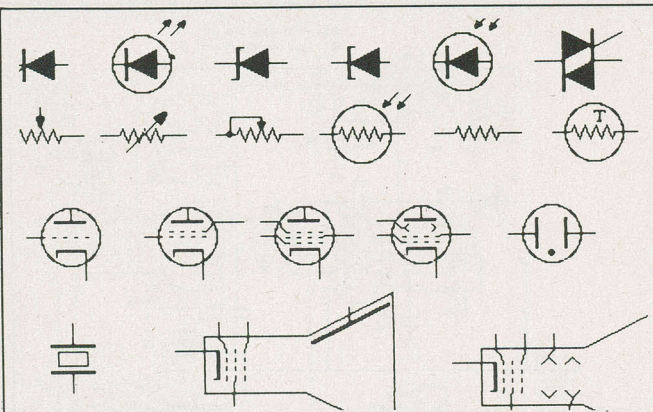
In order to make the grid work for you, the parts of the symbols which are going to connect to other symbols should land on the grid increments. As an example, the resistors... those jagged lines in the accompanying drawings, for the architects among us... were carefully positioned when I created the symbol set so that their leads fell on grid positions. Furthermore, the symbols should also be designed so that if they're rotated ninety degrees they'll still line up with the grid.



The drawing on the screen is such that one has to move around a lot.

The creation of a complex symbol set is not a trivial undertaking. I did the electronic ones as pages for MacPaint... this is a reasonably convenient way to design things, but it doesn't lend itself to actually using the symbols.

Having set up the symbols on pages, the best way to work with them is to create scrap book entries of small groups of similar symbols. In the case of these schematics, one might have all the



A fragment of the symbol set

resistors on one page, all the transistors on another, diodes on another and so on. Because there is no way to handle individual symbols under MacPaint, aside from cutting and pasting them, whatever space one's scrap book pages occupies must be available on one's drawing to put the page of symbols while they're being manipulated.

Larger pages, as such, mean that one gets less useable space on the work sheet. Smaller pages entail a lot more juggling with the clip board and the scrap book.

If your drawing is such that you can get all the symbols onto a single page you can go at the whole dog and pony show another way. Having created that page, copy it into a second page... read it into MacPaint and then save it as something else... and then delete those symbols you aren't going to be using. You can thereupon manipulate the remaining ones over the whole worksheet without having to provide a landing site for aliens from the clip board.

It's hard to say what the relative size of symbols should be. The grid size determined this to some degree. If you make the symbols too large you won't be able to get much of a drawing together on the work sheet. If you have a reducing photocopier or access to a stat camera, and can, as such shoot down whatever you do it's worth making the symbols a bit larger than you want them. While the Imagewriter printer can do some very nice stuff, its output looks a lot better after it has been blasted through some optics.

Dotless

The symbols are the thing... once you have them, most of the rest of the process of creating a drawing is fairly straightforward. As long as the grid is active you can be quite sloppy and still have the lines and circles come out looking like they've been done by a draftsman... albeit, a draftsman with dot matrix fingers.

The drawing I've done here... it's actually part of an article for an upcoming issue... is representative of the degree of complexity you can manage with MacPaint. It runs to about three quarters of the width of the work sheet area, and to about two thirds of its height. You can, of course, run out to the edge but it would take a bit of forethought to get everything to fit. Electronic circuits are a bit more forgiving about this sort of thing than most... if something doesn't fit you can put it somewhere else and run leads to it.

This isn't as practical on floor plans, for example, as it involves changing the shape of the attendant building... rarely a simple task.

CNI

SMITH-CORONA JUST NARROWED YOUR CHOICE OF COMPUTER PRINTERS DOWN TO FIVE.

Introducing the personal computer printers you've been waiting for. From Smith-Corona.

Each one is remarkable. Each one affordable. Each one designed to meet very particular needs. Starting with the need for speed.

They're fast workers. Put words and numbers on paper at the crisp rate of 140 characters per second with the new Smith-Corona D-300 Dot Matrix Printer. Or as fast as 120 characters per second with the D-200 and D-100.

Compatible partners. The new Smith-Corona printers work perfectly with most major computers. Including IBM, Apple, Commodore and more. Four of these printers

feature a Dual Interface to ensure wide compatibility. The fifth, the Smith-Corona Fastex 80 Dot Matrix Printer, offers Parallel Interface.

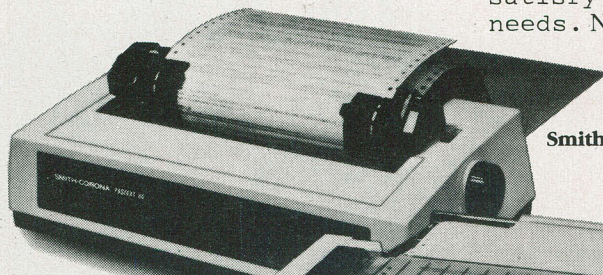
High quality printers. As you can see, the new Smith-Coronas deliver outstanding results. Even at high speeds. **This Dot Matrix print out is as close to letter quality as you can get.** While the L-1000 Daisy Wheel model produces documents that satisfy your most critical needs. Naturally, since document

sizes vary, our paper capacity varies too. From standard 8½" computer paper to 15" widths. (And even smaller sizes when sheet-fed.)

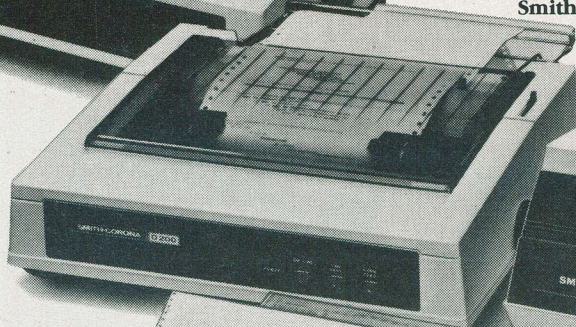
And a reliable investment, all down the line. Because we're Smith-Corona, you get reliability and workmanship second to none. Our national service network is as near as your phone.

So why waste time? To get down to serious computing around your home or office, look into the new line of personal printers from Smith-Corona. Your choice will be easier than you think.

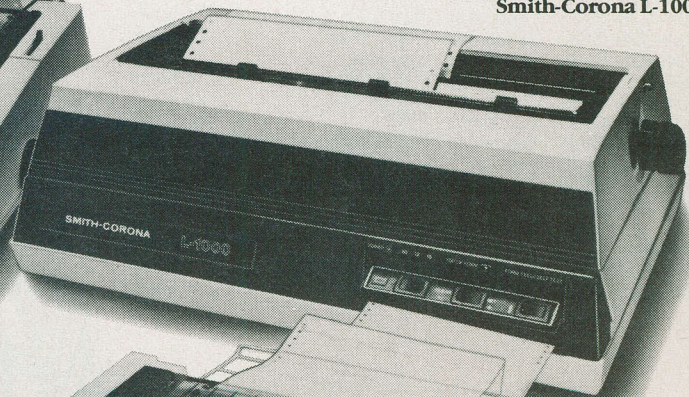
For more information about the full line of new Smith-Corona printers, call your nearest authorized Smith-Corona dealer. Or fill in and mail the coupon below.



Smith-Corona Fastex 80



Smith-Corona D-200



Smith-Corona L-1000



Smith-Corona D-300



Smith-Corona D-100

CN 03/85

☐

Please send me more information about Smith-Corona printers for in-home use.

☐

Please send me more information about Smith-Corona printers for office use.

NAME: _____

COMPANY NAME: _____

BUSINESS ADDRESS: _____

CITY _____ PROV. _____ POSTAL CODE _____

TYPE OF BUSINESS _____

Send to: Bryce Buskard



**SMITH
CORONA**

DIVISION OF SCM (CANADA) LIMITED
440 TAPSCOTT ROAD, SCARBOROUGH, ONT.
M1B 1Y4 (416) 292-3836

Circle No. 14 on Reader Service Card

The Curse of All the BBS Numbers In The World

Argh, Cap'n, they be breedin' like... like... bulletin boards!!!

There are two things of particular note about this list. The first is that there are some boards in Nova Scotia on it, a hitherto unknown phenomenon. These are the first verifiable East coast boards that I've found. The second is the creation of my own BBS, listed as the Full Moon in Toronto. Modesty forbids me from telling you how marvelous it is.

By the way, if you know of a board that isn't on this list, please feel free to leave the details of it on the Full Moon.

British Columbia

604-764-7047	Kelowna	Kelowna BBS	5 pm to 8 am
604-562-9519	Prince George	Prince George RCP/M	5 pm to 8 am
604-272-2549	Vancouver	Startraders	24 hours
604-325-3811	Vancouver	A.K.A.T.	24 hours
604-438-2468	Vancouver	Satyricon CBBS	24 hours
604-463-7905	Vancouver	Analog BBS	24 hours
604-464-5261	Vancouver	Canada West	24 hours
604-464-7693	Vancouver	POCO BBS	24 hours
604-585-0680	Vancouver	Delta-80	24 hours
604-588-3255	Vancouver	Sprite Computer	9 pm to 9 am
604-596-0146	Vancouver	Basic'ly	24 hours
604-596-0314	Vancouver	FOG RBBS #2	24 hours
604-731-2724	Vancouver	The Twilight Zone	24 hours
604-733-1000	Vancouver	Philosophy BBS	24 hours
604-738-2773	Vancouver	Fast-80	24 hours
604-926-5070	Vancouver	Apple West	24 hours
604-926-8192	Vancouver	Blue Hell	24 hours
604-937-0906	Vancouver	Frog Hollow	24 hours
604-939-1749	Coquitlam	The 64 Station	24 hours
604-946-0955	Vancouver	TVG	24 hours
604-980-9791	Vancouver	North Van	
604-381-2143	Victoria	IBMPCUG	6 pm to 8 am
604-384-7607	Victoria	Provider	24 hours
604-478-2234	Victoria	DataWest	24 hours

Alberta

403-239-3345	Calgary	Dial Your Match	24 hours
403-245-2724	Calgary	The Board	24 hours

This list was done up at the beginning of February, this being as close to press time as possible without actually crawling around at the printers and changing the plates. It is as accurate as it can be. I've tried to include everyone that looked like a viable system, omitting the semi-private boards and the pirates.

by Brian Greiner



403-246-8064	Calgary	Apple Jackes	24 hours
403-252-3149	Calgary	Haysboro RBBS	
403-273-1513	Calgary	Ace-Tech	3 pm to 10 am
403-287-3638	Calgary	Computer Shop BBS	7 pm to 9 am
403-288-1601	Calgary	Dimensions	24 hours
403-425-9543	Edmonton	NAPUG	24 hours
403-426-0352	Edmonton	Bruce's BBS	24 hours
403-435-3321	Edmonton	Round Table	
403-454-6093	Edmonton	Edmonton RCP/M	24 hours
403-461-2960	Edmonton	WCDC	24 hours
403-463-5774	Edmonton	South Side RCP/M	24 hours
403-464-4172	Edmonton	Sntithesystem	24 hours
403-465-3162	Edmonton	That Other Board	
403-466-7656	Edmonton	Bob's BBS	9 pm to 6 am
403-471-2827	Edmonton	Westworld Net-Works	24 hours
403-474-0147	Edmonton	North Alberta COCO	24 hours
403-481-2596	Edmonton	Crossroad	
403-481-6164	Edmonton	Brian's BBS	24 hours
403-484-5981	Edmonton	Meadowlark RCP/M	24 hours
403-425-9543	Leduc	IBM PC Users' Group	24 hours
403-320-6923	Lethbridge	Looking Glass	
403-347-3482	Red Deer	Town Crier	6 pm to 8 am

Saskatchewan

306-694-4126	Moose Jaw	F.O.A.D.	24 hours
306-525-3973	Moose Jaw	Edu-Net	24 hours
306-584-0748	Regina	Micro City	9 am to midnight
306-586-5585	Regina	EMIS	24 hours
306-789-0341	Regina	MegaSoft	9 pm to 10 am
306-789-7883	Regina	Shadowland	
306-949-7766	Regina	Rabid	6 am to 6 pm
306-242-3134	Saskatoon	SPCUG	6 pm to 8 am
306-374-2391	Saskatoon	Color80	24 hours

Manitoba

204-785-8742	Selkirk	MMS BBS	24 hours
204-942-1109	Winnipeg	VE4 Micro BBS	24 hours
204-943-9007	Winnipeg	RCP/M	24 hours

Ontario

519-853-1063	Acton	PSOC	24 hours
705-737-1599	Barrie	Computerland	6 pm to 8 am
416-632-5653	Burlington		
519-853-1063	Chatham	Pit Stop	24 hours
705-445-6032	Coll- ingwood	TBBS	5 pm to 9 am
416-898-2962	Newmarket	Druid Board	24 hours
416-576-3213	Oshawa	CIBB	6:30 pm to 8 am
416-433-0804	Oshawa	Computerland	6 pm to 10 am
613-230-7154	Ottawa	Compucentre	9:30 pm to 8 am
613-236-1145	Ottawa	Alleycat	24 hours
613-523-1614	Ottawa	O.B.E.	24 hours
613-592-0240	Ottawa	Edu-Tot	24 hours
613-722-7949	Ottawa	User Port	24 hours
613-725-2312	Ottawa	Home Computing Club	24 hours
613-725-9295	Ottawa	Conference Centre	24 hours
613-727-0575	Ottawa	Modem World	24 hours
613-738-0617	Ottawa	TI-99/4 UG	24 hours
613-748-1035	Ottawa	E.T. Wilson	24 hours
613-820-0010	Ottawa	TBC-3	24 hours
613-820-4646	Ottawa	TBC-1	24 hours
613-820-4669	Ottawa	TBC-2	24 hours
807-345-7161	Thunder Bay	Chalkboard	
807-622-2685	Thunder Bay	TBBS/TB	24 hours
416-226-9260	Toronto	Willowdale CBBS	24 hours
416-231-0538	Toronto	Toronto RCP/M PC	24 hours
416-232-0442	Toronto	Toronto RCP/M CP/M	24 hours
416-232-1470	Toronto	Toronto RCP/M BBS	24 hours
416-241-4513	Toronto	Night Hawk	24 hours
416-272-0709	Toronto	BBBBS 4	24 hours
416-275-0360	Toronto	Mississauga Line	24 hours
416-277-9163	Toronto	Flight Deck	24 hours
416-279-9154	Toronto	Polar Bear	24 hours
416-281-9452	Toronto	After Hours	6 pm to 8 am

416-293-7349	Toronto	Dragon's Den	24 hours
416-366-2069	Toronto	CFTR BBS	24 hours
416-423-5149	Toronto	ETI/CN! BULL	6 pm to 8 am
416-439-0065	Toronto	Games BBS	7 pm to 7 am
416-445-3083	Toronto	Phobos II	9 pm to 8 am
416-445-5192	Toronto	PMS LOGIC	24 hours
416-445-6696	Toronto	ProNet I	24 hours
416-454-3046	Toronto	Info-Tek	24 hours
416-463-5411	Toronto	Unix Pipeline	24 hours
416-481-8661	Toronto	BBBBS 2	24 hours
416-481-9047	Toronto	BBBBS 3	24 hours
416-482-2823	Toronto	Nightowl	24 hours
416-485-9245	Toronto	Castaways	24 hours
416-487-2593	Toronto	Nortec	24 hours
416-487-5833	Toronto	BBBBS 1	24 hours
416-488-9718	Toronto	Trash Can	
416-491-9050	Toronto	Big Blue	24 hours
416-492-7960	Toronto	Apex	24 hours
416-493-2408	Toronto	TOC	24 hours
416-494-8046	Toronto	Vanguard	24 hours
416-495-9232	Toronto	Compustock	24 hours
416-534-2859	Toronto	VidTek	24 hours
416-592-9705	Toronto	Alien World	24 hours
416-593-7460	Toronto	Arkon Infosystem	24 hours
416-598-1934	Toronto	Boards Galore	24 hours
416-622-2462	Toronto	Atari Infosystem	24 hours
416-630-4737	Toronto	Full Moon	24 hours
416-640-3434	Toronto	TBBS	24 hours
416-653-2248	Toronto	Colour Dragon 1	24 hours
416-673-0557	Toronto	SGV	24 hours
416-675-3214	Toronto	Info-80	24 hours
416-683-3733	Toronto	ProNet II	24 hours
416-698-7994	Toronto	Temple of Doom	24 hours
416-731-4797	Toronto	Jail	24 hours
416-743-6221	Toronto	CoCo Nut	24 hours
416-751-6337	Toronto	PCanada	24 hours
416-782-9534	Toronto	TPUG	24 hours
416-783-6984	Toronto	IAFYF	24 hours
416-787-8630	Toronto	NetCan II	24 hours
416-823-4521	Toronto	Colour Dragon 2	24 hours
416-844-2483	Toronto	OTB	24 hours
416-964-6886	Toronto	Buy&Sell	24 hours
416-964-7665	Toronto	Pool	24 hours
416-964-9657	Toronto	Student Exchange	24 hours
416-978-6893	Toronto	Medical Network	24 hours
416-668-2078	Whitby	Red Baron	24 hours

Quebec

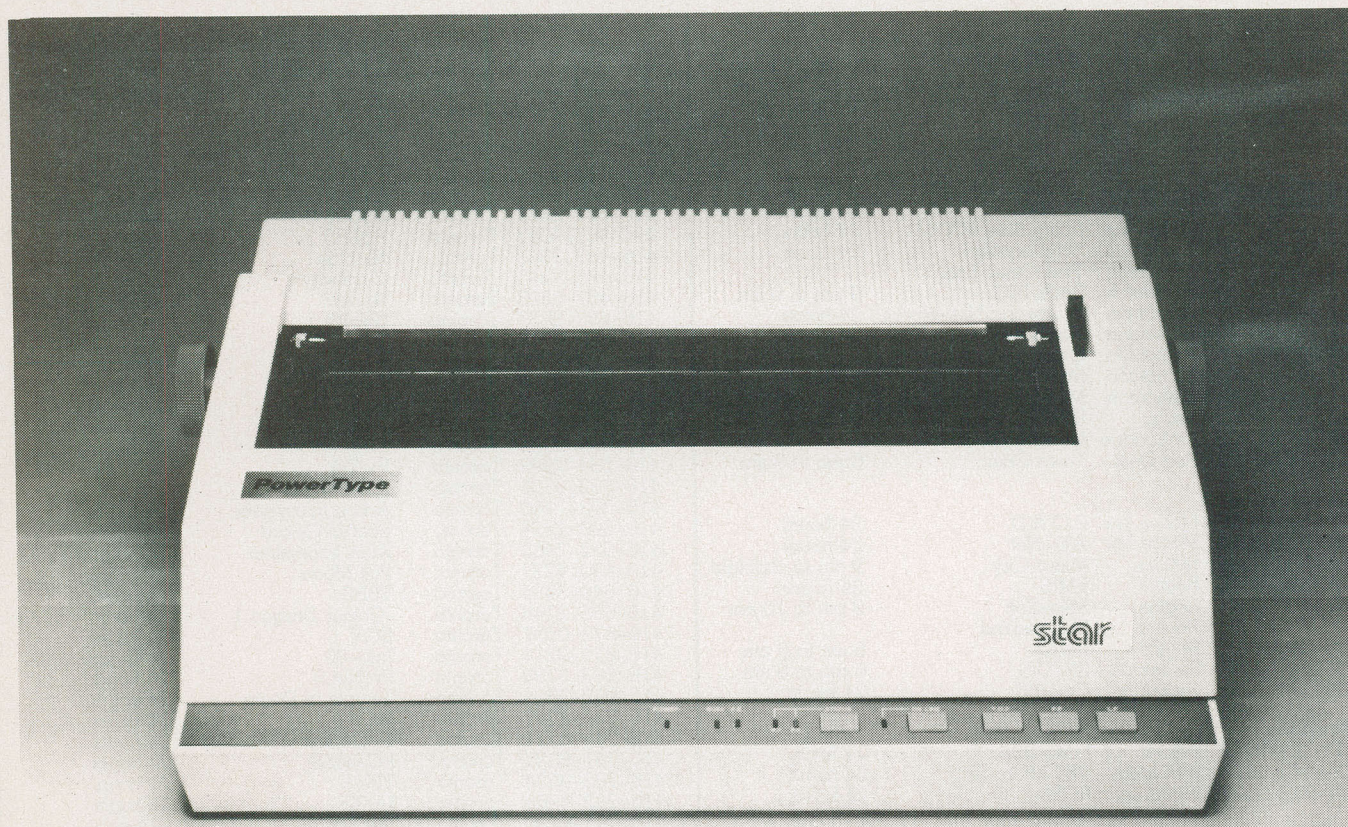
514-365-9914	Montreal	Connection	
514-366-0795	Montreal	Task Force	
514-392-8411	Montreal	T50	
514-481-6371	Montreal	Stonehenge	
514-487-2792	Montreal	Microdial	
514-598-9093	Montreal	Babilog	24 hours
514-622-8586	Montreal	Belle	24 hours
514-671-9377	Montreal	Temple of Doom	
514-683-5013	Montreal	Blackhole	24 hours
514-683-9176	Montreal	Gamma On-Line	
514-684-5464	Montreal	Cache	
514-684-7101	Montreal	Cache II	24 hours
514-697-1279	Montreal	Kurtz's Compound	24 hours
514-697-9947	Montreal	Atari	6 pm to 11 pm
514-738-6579	Montreal	Transfers II	
514-931-8346	Montreal	Kurtz's II	
514-932-9110	Montreal	Treasure Island	
514-933-4200	Montreal	Computerland	9 pm to 8 am
514-937-6249	Montreal	USS BBS	

Nova Scotia

902-434-3121	Dartmouth	TIBBS	
902-434-5278	Halifax	Colorama	9:30 pm to 8 am
902-435-1495	Halifax	Wee Computer	24 hours
902-455-5123	Halifax	Softwerx	6 pm to 8 am

* Except for those few decidedly inconsequential systems which have the unspeakably bad grace to be located outside of Canada.

Star Powertype Review



A daisy wheel printer with the features of the PowerType would have cost more than your computer did a few years ago.

by Terry Taller

Two Interfaces... No Waiting

The *PowerType* comes with both a serial and standard Centronics interface. There is no need to purchase a separate optional interface. You can switch between the parallel and serial ports by flipping a couple of easily reached DIP switches.

The user can control the character spacing of the printer either manually or under software control. One has the choice of ten, twelve and fifteen characters per inch, as well as proportional spacing. The printer can also handle microspacing.

In this price range few of the other printers available offer proportional printing. This feature allows one to produce print which resembles that which is done by a typesetter, with each character taking up a portion of the line commensurate with its width. It doesn't produce the sort of results one expects from dedicated word processors in industry, but it'll do.

A low cost letter quality printer may be the answer to your prayers. Getting fully formed characters onto paper without having to take out a third mortgage on your house has always been a bit of an elusive quest.

The low cost daisy wheel printers which emerged a couple of years ago had a number of things in common. They were all noisy, painfully slow and relatively stupid; they couldn't do much more than simply spit characters onto a page. By comparison, a dot matrix printer, for rather less money, could do different fonts, type sizes, sub and super scripts and varying effects. However, dot matrix print has a look all of its own.

The most recent generation of low cost daisy wheels has largely overcome the deficiencies of those earlier beasts. Not surprisingly, one of the most cost effective of these printers has emerged from Star Micronics, who also produce the popular Gemini printers.

The *PowerType* also features variable line spacing. Once again, it can be controlled either through DIP switches or by software. Under manual control it can be adjusted to three, four, six or eight lines per inch. The software control allows one to step through forty eighths of an inch.

There are several switches on the front of the printer to, among other things, allow you to provide for a carriage return with or without a linefeed. This facility is quite useful, as, for example, WordStar sends a line feed after a carriage return, as do most CP/M based programs, while SuperScript, running on a Commodore does not, and will want a line feed inserted for it.

There's another extremely useful switch at the front of the printer. The *PowerType* can be set to accept WordStar print commands, such as underscore, superscript, boldface, overprint, double strike and subscript. Alternately, the printer can be set to produce the same results when given Ep-

son compatible dot matrix printer commands... at least to the limit that these facilities are available on a letter quality printer.

There are further facilities of the *PowerType* adjustable through DIP switches. These things are notorious for being placed in inaccessible crevasses of printers, but they're right at the front of the *PowerType*, and are extremely easy to get at. These switches set, for example, which of the two... serial or parallel... interfaces will be used and what sort of print wheel the system is operating with. One has a fairly wide choice.

There is also a switch which allows one to select the amount of pressure for the print wheel hammer. There are three levels of print density.

The ribbons used by the *PowerType* are the standard Diablo *Hytype* ribbon cartridges. This allows one to select film cartridges as well as repeatable nylon ones. This also allows one to find ribbon sources which are considerably cheaper than actual Diablo and Star products. The ribbon cartridges are extremely easy to change.

in the paper bail. If you intend to do a lot of printing with one you will have to get an optional tractor feed. Without a tractor feed and using continuous form paper you will find the paper heading for a left hand detour after three or four pages. This requires that you take the printer off line in order to adjust the paper and go on. The weak paper bail only hastens this process.

The paper guide is a simple little piece of chrome that even the cheapest typewriters tend to have. It ensures that when you insert a second piece of paper you are putting it in at the same place the first piece of paper was inserted giving you relatively consistent margins. The *PowerType*, sadly, lacks this simple device.

Finally, some words should be offered regarding the *PowerType*'s manual. Star Micronics seems to have some peculiar ideas about documentation.

There is a preliminary manual with the *PowerType* with a cryptic note attached which says that Star is having a final manual written now and if one mails in the owner-

ship registration it will be forwarded when it's complete. I haven't actually seen the final book yet, so I can't say what it's like. Fortunately the preliminary manuals is well written and easy to follow.

The negative aspects of the *PowerType*, however, are few and fairly inconsequential. It seems to be a well built, sophisticated and extremely well thought out piece of hardware, well suited for most tasks expected of a daisywheel. After checking quite a few letter quality printers I feel that there isn't a better printer available for the price of the Star Micronics *PowerType*.

CNI

Specs

Printer:	PowerType
Type:	Daisy Wheel
Ribbon type:	Diablo
Print Wheel	
Type:	QUME
Characters per second:	18
Characters per Inch:	10 and 12
Manufacturer:	Star Micronics
Distributor:	Exceltronix
Price:	\$639.00

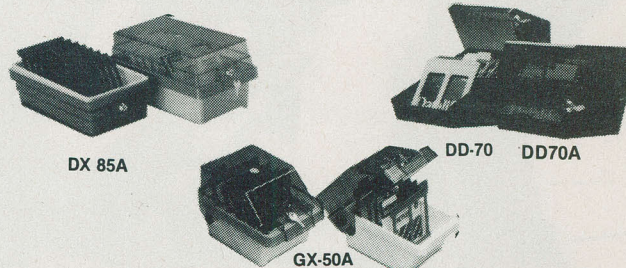
The printwheels used by the *PowerType* are QUME compatible. They allow for ninety-six characters, as opposed to the hundred and twenty-seven found on Diablo and Diablo compatible printers. I counted almost a hundred and fifty different fonts available from a local dealer.

There are lots of manufacturers you make QUME compatible printwheels for a lot less than what you will pay for Star or QUME wheels.

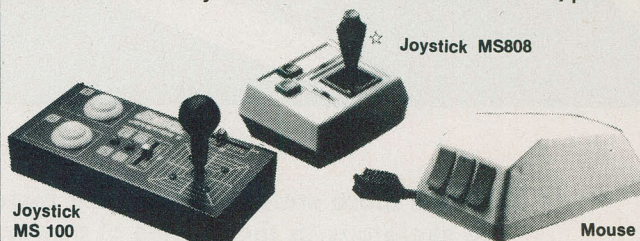
A Few Bugs

The *PowerType* I have needs more tension

Dealers!! Accessories At The Lowest Prices



Diskette Library Cases 5-1/4" & 3-1/2" in types



Joysticks Apple/IBM/Commodore/Atari
Attractive Quantity Discounts Available
Contact us for more Details

Gentek

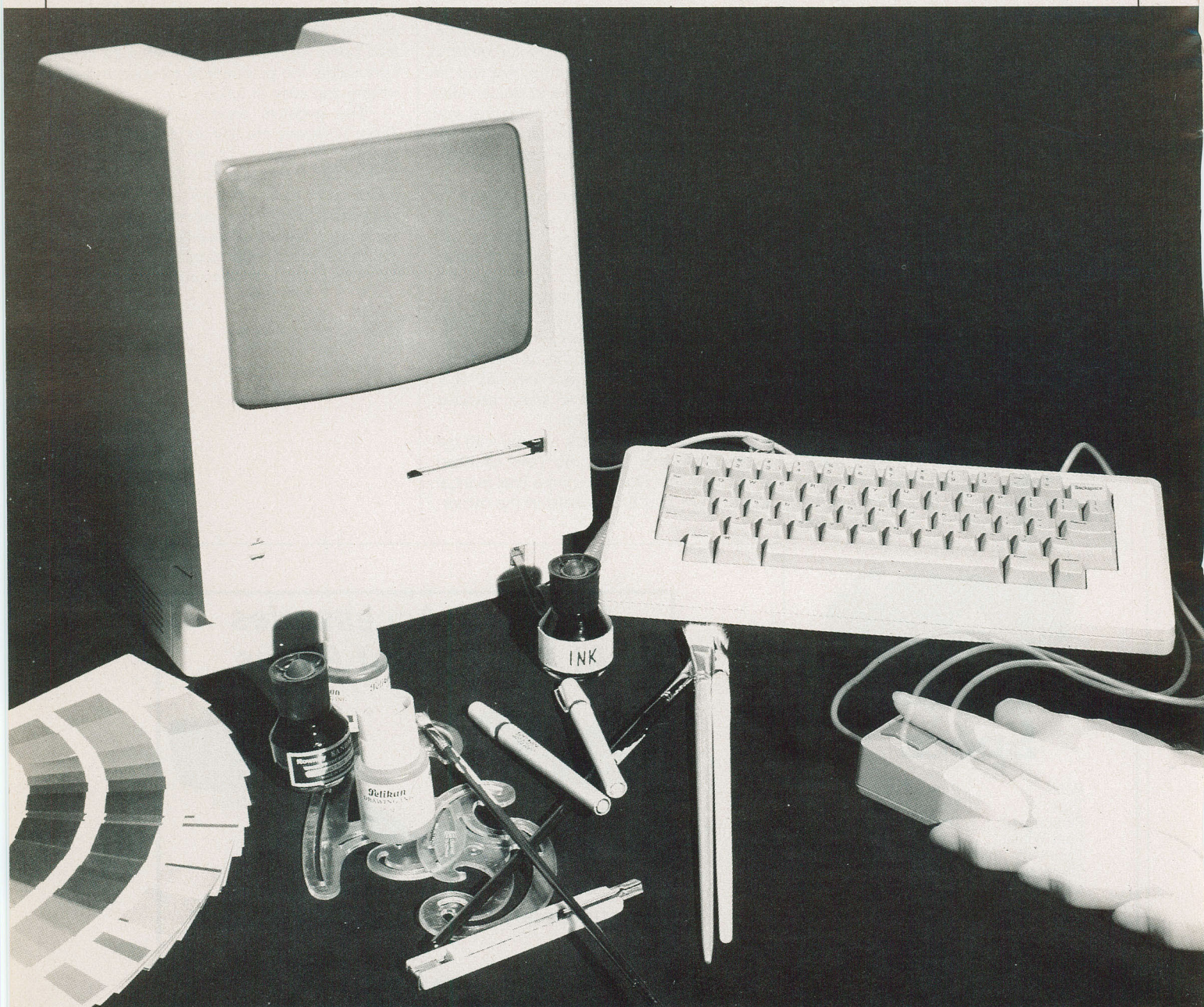
Computers Inc.

Dealers Only Please

228 Canartic Drive
Downsview, Ontario M3J 2P4

416-665-0234

QuickDraw on the Mac



There is more stuff hidden away inside the Macintosh than there are skeletons in the closets of power... all right, then, almost as much. Here's a look at some of the tricks involved in utilizing one of the system's most powerful set of utilities, the QuickDraw routines, from one of its most user friendly applications, Microsoft BASIC.

by Steve Rimmer

Without its graphics the Macintosh would be little more than a really slick looking paperweight. It would have had a brief moment in the sun of human aspirations... they might have put it in a fake cardboard cage and sold it as "Pet Macs", and probably have been sued by Commodore. It would have been turning up at garage sales and flea markets for years afterwards, along with the vegetable mashers and John Travolta T shirts. Anyone remember John Travolta? No? Good...

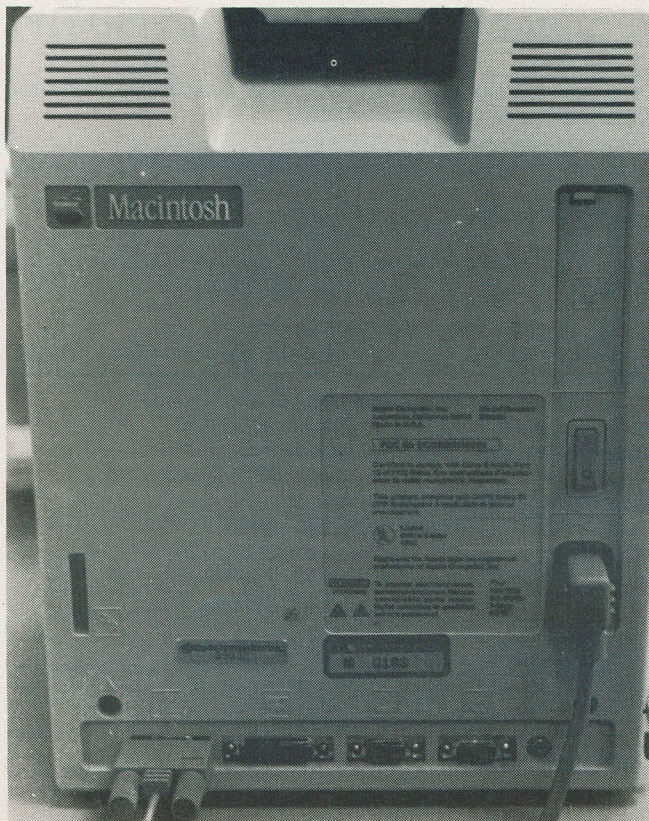
As it all happens, however, the Mac has some of the slickest graphics facilities one can imagine. Not surprisingly, virtually every bit of software written for the system uses these to some degree, even the spreadsheets and data base managers... which aren't in the least bit graphically oriented.

Writing your own programs for the Mac in Microsoft BASIC can be a bit frustrating in this respect. BASIC, while powerful in many areas, seems to lack much of the graphics power which the Mac's system... the finder... seems able to provide. In fact, it doesn't lack them so much as it doesn't really bust its arches to give you access to them.

There is some amazing graphic stuff available from BASIC... sadly, much of it isn't too well documented. At least, it isn't documented in the BASIC manual. There are other ways to check it out, however.

QuickDraw

If you've checked out a lot of Macintosh software you may have noticed the amazing similarity of things like dialog boxes, screen patterns and the way the system generally behaves, even between software from competing manufacturers. There's an actual reason for this.



The operating system of the Macintosh is very much more complex than that of a PC or an Apple II. Because the Mac relies so heavily on its graphics facilities, there is a pot full of stuff in there to manage the images and pixels.

The kernel of the graphics stuff is contained in a set of routines called *QuickDraw*, which are designed to be accessed from Mac Pascal. You probably don't have Mac Pascal. That's okay... I don't either. In fact, almost nobody has it. As of this writing, Apple hadn't seen fit to spring it on the great unwashed.

The QuickDraw routines are alluded to in the Microsoft BASIC manual for the version one BASIC and hinted a bit more at in the book for version two. They're completely described in a two volume ring binder book called "Inside Macintosh"... which Apple won't generally allow to fall into the hands of anyone they don't really like. They really liked us for a while, and, as such, sold us a copy of the book.

Once you've harnessed QuickDraw you can manipulate the graphics of the system in all the ways really heavy packages like MacPaint do. The only snag, at least from the point of view of Microsoft BASIC users, is that only a small percentage of the available QuickDraw calls can be handled through BASIC... this, and the fact that given the manual alone very few users will ever figure out how the things are supposed to be used. Usually you just get that cute little bomb icon and then get to watch the system reboot.

The QuickDraw calls from BASIC are actually fairly tame in comparison to what you can do from Pascal. However, once you get them going they'll allow you to handle a lot more with the interpreter than you could with the BASIC syntax alone. Among other things, you can change the back pattern and the shape of the cursor, adjust the pen width, draw rectangles, "round rectangles"... rectangles with rounded corners... arcs, ovals and circles. You can also invert areas of the screen, a common Macintosh effect.

More to the point, however, is that you can do all this stuff at the same speed that the Mac normally does it when it's turned loose on a commercial applications program... meaning that you can write applications in BASIC which look pretty real.

We're going to look at some of the techniques for using these routines and the attendant Microsoft graphics facilities.

Call for Help

The program which accompanies this article is a not terribly practical example of Macintosh BASIC code called MacBleep. It is written in BASIC 2.0, which is unquestionably one of the nicest things that anyone ever did for the Mac. However, the techniques for using the QuickDraw calls will work equally as well if you're still laden with BASIC one.

This not particularly practical program has been written so as to use lots of graphics stuff and, as such, serve as a working example of how the little toe munchers do their things.

Let's begin with one of the most perplexing quandries on the Mac, to wit, the calling of the shape functions.

Microsoft BASIC supports a number of shape functions, all of which work largely the same way. Let's take *FrameRect* as an example. The syntax for using this is

CALL FrameRect(Varptr(i%))

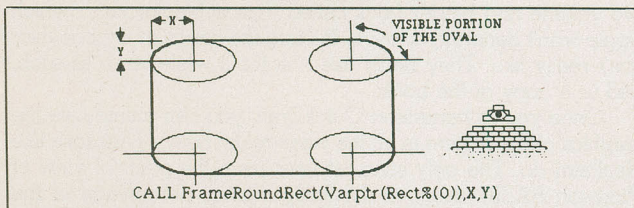
Without some forethought, this statement will do nothing at best, and, very possibly hang the Mac if the tides of civilization turn against you. However, if you look at the program shortly after the REM statement that says "crate the notes" you'll find a somewhat intelligible example of this thing at work.

QuickDraw on the Mac

The trick is that the call is tied in with the two lines immediately above it.

The *FrameRect* call wants to be passed a single argument, which is, in fact, a pointer. The pointer should point to a table of four sixteen-bit numbers which contain the co-ordinates of the upper left hand corner and the lower right hand corner of the rectangle that this call will eventually draw. If we had a machine language assembler, this table would go

TABLE: DW TOP_VERTICAL
DW TOP_HORIZONTAL
DW BOTTOM_VERTICAL
DW BOTTOM_HORIZONTAL



The diversions of a noured rectangle. Ignore the pyramid... it's a MacPaint doodle.

The horizontal and vertical positions are kind of the wrong way around, but that's how the Mac likes to see them.

As it happens, an integer variable under BASIC, that is, a variable with a percent sign after it, is represented in memory as a sixteen bit number. If one creates an array of four integer

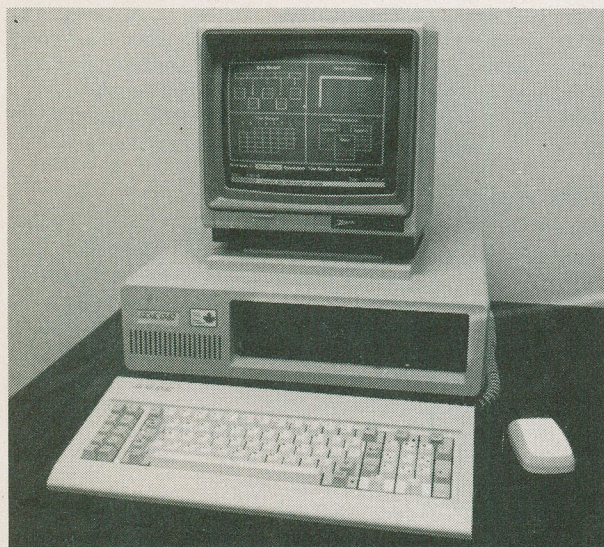
variables with consecutive indices, as I've done just prior to the call, and then points the call to the first one, QuickDraw will consider this to be close enough for jazz and draw the box... or whatever else it call been called on to do.

Making one of the shape calls work, then, entails setting up an array, *rect\$(0)* to *rect\$(3)* in this case, with the zero'th element holding the vertical co-ordinate of the upper left corner, the first element holding the horizontal co-ordinate of the upper left corner, the second element the vertical co-ordinate of the lower right corner and the third the horizontal co-ordinate of the lower right corner.

Pointing the call to where the array is turns out to be very simple. As you'll probably have figured out in using BASIC, one cannot reasonably predict where the contents of a variable will be stored in memory, and, more to the point, even if one could, the information very quickly becomes invalid as BASIC likes to move things around. As such, there is a function under BASIC called *VARPTR* which returns a number that is a pointer to the variable it's given as an argument. It almost seems to have been designed for this application.

In addition to being able to decide where a box will go by manipulating *FrameRect*'s table of data, you can also change the thickness of the line it uses to create a box by calling *PenSize*. Fortunately, this call is a great deal less involved. It wants two arguments passed to it, the first being the number of pixels wide you want the line and the second the number of pixels high.

GENESYS — MADE IN CANADA — ONE YEAR WARRANTY



The GENESYS is available in various system configurations:

- complete basic (as described) systems starting at \$1995
- systems with internal 10 or 20 Meg hard disk drives
- full featured CAD systems - complete networked systems

FOR MORE INFORMATION on the GENESYS or the BUILD A COMPUTER program, or to receive a free copy of our catalog (and our computer shoppers checklist), write or call us at:

COMPUTECH MICRO DESIGN, (416) 673-3300,
994 Westport Cres., Unit A5, Miss. Ont. L5T 1G1

If you've been shopping around for an IBM compatible computer, you've probably asked a lot of questions...

Have you gotten many answers like these...

- One Year Warranty on complete system (including drives & keyboard)
- Designed and manufactured in Canada
- Complete IBM PC/XT hardware and software compatibility
- Ready to run PC-DOS & MS-DOS software (improved BIOS included)
- Comes standard with the New HERCULES Colour Graphics/Text video card
- Printer interface included as standard
- Quality IBM compatible keyboard with two other keyboard styles optional
- Uses New Shugart SA455-3 drives (362K using PC-DOS 2.1)
- RAM is expandable to 256K on-board, 640K total
- 8 IBM compatible peripheral/expansion slots
- Constructed using highest quality parts, all fully socketed
- Hinged cover for quick and easy access
- Purchase direct from the manufacturer - lower price - better support

And are the other companies/stores able to assist you with or give you advice on hardware and software, or install everything from a simple, basic system to a high-powered professional CAD system to a complete networked classroom configuration?

We also carry more IBM compatible peripherals, accessories and software than most large computer stores. So if you have a computer or your just shopping around, send for our price list.

BUILD A COMPUTER

If your interested in building your own computer, we also run well organized and fully supervised 6 week evening courses that cover everything from what a soldering iron is, to how your computer works - and we guarantee your machine for one year!!


```

REM      MacBleep
REM      Copyright © 1985 Steve Rimmer
REM      Sounds best playing Grateful Dead

```

```

REM --- initial defines
true = 0
false = NOT true
OldBox% = -1      'default for OldBox pointer
PenW% = 2         'width of pen to draw boxes
StatusLine% = 20  'y position of status line
NoteStat% = 100   'where to print current note
TimeStat% = 200   'where to print current time
TopNote% = 63     'bit position of highest note
BottomNote% = 120 'bit position of bottom note
FirstNote% = 100  'bit position of first note
DIM Note%(120)    'array to hold note image
DIM BackRub%(240) 'array to hold background
DIM ToneValue%(32)

```

```

GOSUB SetArrays

```

```

REM --- get the staff to the screen
OPEN "StaffImage" FOR INPUT AS 1
image$ = INPUT$(LOF(1),1)
PICTURE, image$
GET(FirstNote%,TopNote%-25) - (FirstNote%+25,TopNote%+60),
  BackRub%

CALL MOVETO(NoteStat%-40,StatusLine%)
PRINT "Note: "
CALL MOVETO (TimeStat%-40,StatusLine%)
PRINT "Time: ";

```

```

REM --- crate the notes
CALL PENSIZE(PenW%,PenW%)
FOR x%=0 TO 160 STEP 32
  rect%(0) = 170 : rect%(1) = 100+x% : rect%(2) = 205
  rect%(3) = 125+x%
  CALL FRAMERECT(VARPTR(rect%(0)))
  ty%(x%/32) = rect%(0) : lx%(x%/32) = rect%(1)
  by%(x%/32) = rect%(2) : rx%(x%/32) = rect%(3)
NEXT x%
GOSUB InvertBox 'set up default note

```

```

REM --- get the mouse and do stuff
CheckNote:
flag% = true
WHILE (RatY% >= ty%(0) AND RatY% <= by%(0)) OR NOT flag%
  WHILE MOUSE(0) < 1 : WEND :
  RatX% = MOUSE(1) : RatY% = MOUSE(2)
  IF RatY% < ty%(0) OR RatY% > by%(0) THEN flag% = false :
    GOTO WendIt

```

```

FOR ix% = 0 TO 5
  IF RatX% > lx%(ix%) AND RatX% < rx%(ix%) THEN RatBox% = ix%
  + 1
NEXT ix%
IF RatBox% = 0 THEN flag% = false : GOTO WendIt
InvBox% = RatBox% - 1
GOSUB InvertBox
IF RatBox% = 6 THEN CLS: END
CALL MOVETO(TimeStat%,StatusLine%)
PRINT NoteTime$(RatBox%)
ToneMeasure% = 18.2 * (1/RatBox%)

```

```

WendIt:
WEND

```

```

NotePos% = ((BottomNote% - RatY%)/4) + 1
NoteCol% = FirstNote% + (30 * INT((RatX% - FirstNote%)/30))

```

```

NoteRow% = TopNote% + (4 * INT((RatY% - TopNote%)/4))
IF NotePos% < 1 OR NotePos% > (BottomNote% / 8) THEN
  NoStaff
IF NoteCol% < (FirstNote% - 60) THEN NoStaff
CALL MOVETO(NoteStat%,StatusLine%)
TempNote$ = MID$ ("ABCDEFGGABCDEFABCDEF",NotePos%,1)
TempNote% = TempNote$ + RIGHT$(STR$(INT(NotePos%/8)),1)
PRINT TempNote%;
PUT (NoteCol% + 6,TopNote% - 25), BackRub%,PSET
PUT (NoteCol% + 6, NoteRow% - 23), Note%,OR
SOUND ToneValue%(NotePos%),ToneMeasure%
NotePoint% = INT((NoteCol% - FirstNote%)/30) + 2

```

```

NoStaff:
GOTO CheckNote:

```

```

REM --- Submarines

```

```

InvertBox:
GET (lx%(InvBox%)+PenW%,ty%(InvBox%)+PenW%)
  (rx%(InvBox%)-(2* PenW%),by%(InvBox%)-(2*
    PenW%)), Note%
IF OldBox% < 0 THEN NoOldBox
rect%(0) = ty%(OldBox%) : rect%(1) = lx%(OldBox%)
rect%(2) = by%(OldBox%) : rect%(3) = rx%(OldBox%)
CALL INVERTRECT(VARPTR(rect%(0)))
NoOldBox:
rect%(0) = ty%(InvBox%) : rect%(1) = lx%(InvBox%)
rect%(2) = by%(InvBox%) : rect%(3) = rx%(InvBox%)
CALL INVERTRECT(VARPTR(rect%(0)))
OldBox% = InvBox%
RETURN

```

```

SetArrays:
NoteTime$(1) = "Whole Note" : NoteTime$(2) = "Half Note"
NoteTime$(3) = "Quarter Note"
NoteTime$(4) = "Eighth Note"
NoteTime$(5) = "Sixteenth Note"
FOR ix%=1 TO 16
  READ ToneValue%(ix)
NEXT ix
RETURN
DATA 440,494,523,587,659,698,784,880,988
DATA 1046,1174,1318,1390,1568,1760,1976

```

Sharp Edges

There are a number of other calls which behave like *FrameRect* to varying degrees. *InvertRect*, for example, will take a table of co-ordinates in exactly the same way that *FrameRect* did. However, it will invert all the pixels in the area described by that rectangle. All the black bits will turn up white and the white bits... ha, you've guessed it... glow purple. No, sorry... white.

It's important to note that *InvertRect* doesn't have to invert a rectangle that you've drawn on the screen. It will pretend that there's a border for it, as is specified by the table of parameters.

There is also something called *FillRect*, which is a little trickier than the others, as it has two pointers as arguments. The first is the usual table of corner co-ordinates, but the second is a pointer to a table of four more sixteen bit values which define a bit pattern. Bit patterns on the Mac are a really lively can of swamp eels... we'll check them out at a future juncture of time and space.

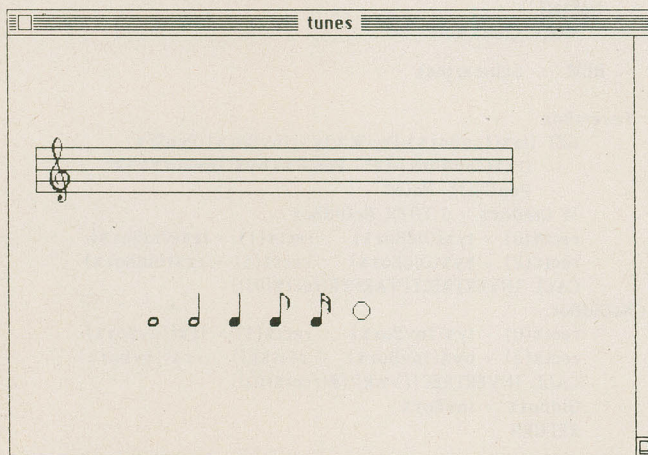
There is a set of routines which corresponds to the rectangle stuff to draw rectangles with rounded corners. The counterpart to *FrameRect* is *FrameRoundRect*. These things are a bit trickier to use inasmuch as, while *FrameRect* had one argument, a pointer to its table, *FrameRoundRect* has three. The additional two

QuickDraw on the Mac

specify the width and height of the oval which is installed in the corner of the rectangle. In fact, you only have to look at a quarter of the oval in each corner.

Observe the picture that's around here somewhere for a more complete understanding of this weirdness.

In addition to there being routines to do boxes, you can also draw circles and ovals, the former being a subset of the latter. The ovals are considered to be set within rectangles, so one simply specifies the rectangle in which one wants an oval, in the now familiar table and pointer, and calls the appropriate routine. *CallFrameOval*, for example, draws an oval.



You'll have to create this screen with MacPaint.

A subset of the oval drawing routines, the arc routines allow one to draw bits of ovals. They are called like the rectangle and oval routines, except that they have two additional arguments to specify the beginning and end of the arc to be drawn. It wants the specification in degrees, which is unusually civilized. This is a simple example of how to use these calls. It actually redraws the arc three hundred and sixty times, each iteration being one degree further around the pole than the last. The rest is a very tediously drawn oval.

```
Rect%(0) = 50 : Rect%(1) = 50
Rect%(2) = 100 : Rect%(3) = 150
FOR X% = 0 TO 359
  CALL FRAMEARC(VARPTR(Rect%(0)),0,X%)
NEXT X%
```

The final routine set we're going to check out is the polygon drawing stuff. These guys will do shapes with any number of sides you fancy. These things are considerably more tedious to use because they involve generating fairly complex tables to specify every co-ordinate of every corner in the polygon.

The structure of a polygon table is as follows. We'll set it up in the array *Poly%(0)*. The first element in the array, *Poly%(0)*, is the number of bytes in the array plus two... the plus two being the two bytes in *Poly%(0)* itself. The next two elements in the array are the vertical and then the horizontal co-ordinates of the first corner of the polygon. The next two handle the next co-ordinates, and so on, until the table is filled.

One would then call *FramePoly* with the *Varptr* pointing to *Poly%(0)*. Doing polygons this way is a moderate drag, especially inasmuch as there are easier ways to handle them in most applications. However, having figured out the table these things draw pretty quickly.

Ze Code

Finally, I'll offer a brief word about exhibit "A", the program. This has been condensed a bit to make it fairly reasonable to type in. It doesn't do a great deal as a result, but most of the useful coding examples are fairly easy to fathom.

Unlike the QuickDraw calls themselves, this program will only run under BASIC version two.

The first thing you'll have to do is to create a file called *StaffImage* which holds the screen shown here... the thing with the staff. I actually lifted the staff from the music program that comes with BASIC version two and edited it using MacPaint. You can get a BASIC screen into the clip board by using the *PICTURE* commands, and, having done so, manipulate it with MacPaint. You'll have to fiddle with this thing a bit to make it line up with where the program thinks it should be on the screen.

The program itself allows you to select notes from the note icons at the bottom of the screen and pop them on the staff. If you lay one down that you thereafter deem to be uncool it can be moved by laying another one over it. This will erase the previous note and replace it with the new beep.

As music software goes this program rates right up there with the things that used to play "Purple Haze" through the speaker of an Apple II+.

There are a number of fairly good things happening here. The most important is the way in which the mouse position is handled. In order to figure out whether the mouse is within a box when it is clicked it's necessary to compare the functions *mouse(1)* and *mouse(2)* with the edge co-ordinates of the box. This is tedious if you have a lot of boxes.

The approach taken in this program is to allow the software to generate an array of box co-ordinates and thereafter do the comparisons with a *for next* loop. The loop... it occurs five lines after the label *CheckNote*... returns a value based on the box the mouse has been clicked in.

This program is only concerned with a single row of boxes. It could have easily have handled a whole screen full in the same way with two nested loops.

The other useful technique in all this is involved in handling the background that the notes are laid down on, to wit, the staff. This is a good example of the use of graphic *PUT* and *GET* statements. In order to make sure that moving a note after it is placed on the staff won't leave a hole in the staff, the program copies the background... a chunk of staff... into an array using *GET*. Thereafter, upon removing one note to install another all it has to do is to *PUT* the array to the screen to wipe out the old note.

Big Mac and Fries

The graphics facilities of the Macintosh under Microsoft BASIC, especially under BASIC 2.0, are enough to make any one even moderately amused with the prospect of writing programs leap into multidimensional paroxysms of ecstasy, flailing away at the keyboard until that high impact styrene fairly melts. It's a trip of the first order.

What's more, the level of effort involved in producing slick looking applications using BASIC is pretty reasonable. You can come up with pretty decent stuff with only a few hours of banging away, whereas doing the same sort of thing on, say, a PC would take micro-eons.

We'll check out some additional uses of QuickDraw in future issues of *Computing Now!*. In the meantime, your Mac awaits you with all its pixels hopping about like leprechauns on a bender. Go for it.

CNI

GLADSTONE

Electronics
Computers
Direct

Twenty years of innovation in new products and technology to the Canadian marketplace 1965-1985!



SINCLAIR QL COMPUTER

See page
12-13

The Sinclair revolution continues! 32-bit processor, 128K RAM, two built-in Micro Drives for programme/data storage, includes four professional integrated software programmes, all for \$799.95

\$799⁹⁵

includes
software



PSION ORGANISER POCKET COMPUTER

\$199⁹⁵

The PSION Organiser is the world's first practical pocket computer. Built-in database function with solid state EPROM data storage up to 32K. Ready to run software packages. Fully programmable. Communications capability. See page 6.

COSMIC PL1 FOUR COLOUR PRINTER PLOTTER

\$249⁹⁵



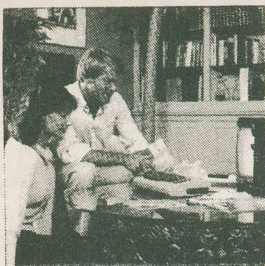
Draws clear high resolution graphics, text, and charts in four selectable colours. See page 20.

Order toll free — have your credit card ready
1-800-268-3640 (to place orders only)
Product Information (416) 787-1448

GLADSTONE ELECTRONICS

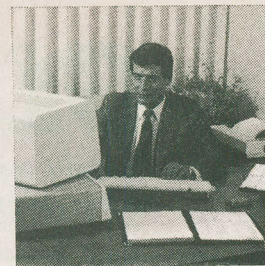
1736 Avenue Rd., Toronto, Ontario M5M 3Y7

Our
20th
Year



CompuServe

COMPUSERVE INFORMATION SERVICE... more than a database, CompuServe delivers information, communications and fun to any computer.



FOR HOME...CONSUMER INFORMATION SERVICE (STARTER KIT)

Now make your home computer more useful than you ever imagined with CompuServe Consumer Information Service. Simply purchase the CIS Starter Kit at \$59.95 and gain access to a new world: Spectacular games with colour graphics, 3-dimensional effects, even sound (with certain equipment); CB simulator with 72 channels available for talking with thousands of other CompuServe subscribers through Canada and U.S.; Over 60 Forums devoted to discussing topics of interest; educational resources; home management; and many other including shopping, recipes, travel. Your kit comes complete with User's Guide in 3-ring binder, "connect time" to acquaint yourself with the service; monthly newsletter; and subscription information. The only equipment required with your computer typically is a modem. Consult us for help. CIS Starter Kit \$59.95

Includes 5 hours connect time — A 60.00 value!

FOR BUSINESS... EXECUTIVE INFORMATION SERVICE

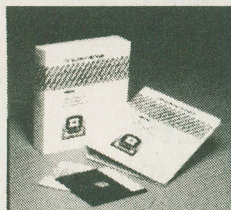
Now managers, investors and entrepreneurs in all fields can obtain high level sophisticated information with minimum effort and expense using computer and modem. Investment information includes ticker retrieval, Standard & Poor's, Value Line Data Base II. News services include Associated Press Wire and Washington Post. Business communications include electronic mail, electronic conferencing, professional forums and more. **Bonus:** with your subscription to EIS you can also access the Consumer Information Service at no charge. Kit includes user guide in 3-ring binder, connect time to acquaint yourself with the service, monthly newsletter, and instructions on obtaining your individual ID number and password. EIS Starter Kit. \$129.95

Includes 2 hours of connect time

VIDTEX COMMUNICATIONS SOFTWARE

From CompuServe, Vindex software makes every minute online far more productive and cost-efficient. Available in machine specific formats, Vindex and the "The Professional Connection" for IBM-PC offers the following features and more: Auto login; function keys; error free uploading and downloading; capture buffer; full printer support. Specify computer: Commodore 64, Apple II/II+ \$59.95

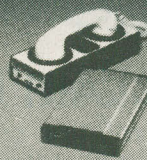
IBM-PC ("The Professional Connection") \$59.95



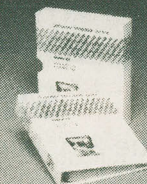
\$59.95 Vindex™
Communications Software from CompuServe makes every online minute far more productive and cost-efficient. Available in machine-specific



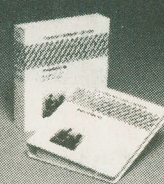
Online Today
Every CompuServe subscriber receives a free introductory subscription to *Online Today*, the timely and informative computer communications magazine.



Modems
Typical "modems." In most cases, it's the only equipment you'll need to link your computer with your telephone and tap into CompuServe.



\$59.95 CompuServe Consumer Information Service Starter Kit



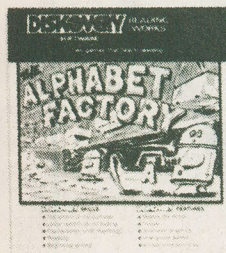
CompuServe Executive Information Service Subscription Kit \$129.95

DISCOVERY

Affordable Educational Software

Canada's finest educational software. Discovery helps children gain new insights, see new relationships and learn important skills for success in school. Teach-developed and classroom tested, Discovery takes skill development seriously then injects fun using your computer's colour sound and graphics to the full. Winner of Parents Choice Award. "A truly unique example of what educational software can be. We recommend it highly", **Creative Computing**. "my daughter is enchanted... outstanding graphics and colour..." unsolicited consumer letter.

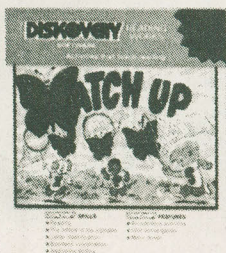
Only \$29⁹⁵
Any 2 for \$49⁹⁵!



AGES 3 to 8

ALPHABET FACTORY allows children to "work" with Robbie the Robot in the Alphabet Factory packing and shipping upper and lower case letters.
* Upper & lower case alphabet learning
* Letter matching
* Symbol recognition
* Early reading

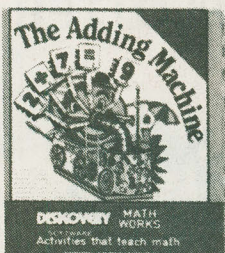
(Disks for Commodore 64 and Atari)



READING SKILLS

MATCH-UP is 4 arcade style games that prepare children for reading and writing.
* Letter, symbol, number matching & recognition
* Punctuation
* Alphabet learning
* Eye-hand coordination
* Beginning reading

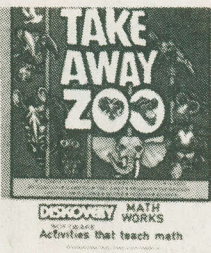
(Disks for Commodore 64 and Atari)



MATH SKILLS

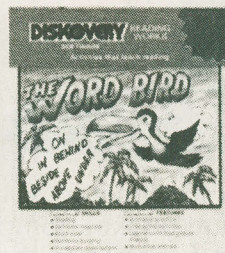
ADDING MACHINE teaches children addition facts using an interactive game format, fun graphics and animated action.
* Adding facts
* Number comparisons
* Set combinations
* **ELECTRIC REPORT CARD** (Print-out option)

(Disks for Commodore 64, Disk for Apple)



TAKE AWAY ZOO lets children learn how to subtract in a fun, game format.
* Counting
* Set separation
* Subtraction facts
* Math practice
* Number awareness
* **ELECTRIC REPORT CARD** (Print-out option)

(Disks for Commodore 64, Disk for Apple)



AGES 6 to 12 READING SKILLS

THE WORD BIRD helps children understand spatial relationships and the words that tell about them using bright, funny and exciting graphics.
* Vocabulary development
* Word order
* Sentence meaning
* Spatial words
* Reading

(Disks for Commodore 64)



TIME ZONE enhances abilities to see relationships between objects in space and events in time using colorful, humorous settings.
* Vocabulary development
* Word order
* Time words
* Sentence meaning
* Reading

(Disk for Commodore 64, Disk for Apple)

COMMODORE 64 SOFTWARE & BOOKS

CALC-PRO

A FINANCIAL SPREADSHEET PROGRAM

AFFORDABLE SOFTWARE

only **\$29⁹⁵**

INTERNATIONAL PUBLISHING & SOFTWARE INC.

CALC-PRO Spreadsheet C64 Disk \$29.95
Full-feature spreadsheet with up to 64 columns and 99 rows. Includes 95 math statements with trig and stat functions. Use of function keys to simplify operation, colour and sound to enhance presentation. A bonus STAT-PAK statistics programme is included.

PERSONAL MONEY MANAGEMENT

AFFORDABLE SOFTWARE

Only **\$29⁹⁵**

INTERNATIONAL PUBLISHING & SOFTWARE INC.

PERSONAL MONEY MANAGEMENT C64 Disk \$29.95
Seven complete programmes for personal/home money management including budget plan, cheque register, net worth, stock market chartist, investment manager and loan amortization. Each programme alone is worth the low package price!

REAL ESTATE MANAGEMENT

AFFORDABLE SOFTWARE

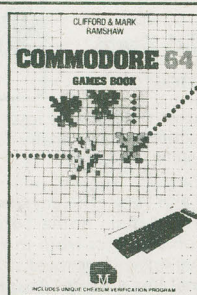
only **\$29⁹⁵**

INTERNATIONAL PUBLISHING & SOFTWARE INC.

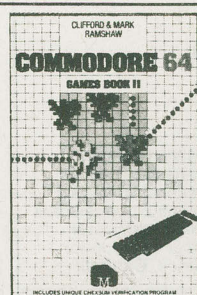
REAL ESTATE MANAGEMENT C64 Disk \$29.95
Measure cash flow for your home or property to discover whether your return on investment is adequate. Practical and educational. Fully menu-driven and easy to use.



Commodore 64 Exposed
A complete and comprehensive guide that clearly explains every function of your C64 from BASIC to Machine Language. Includes full details on advanced programming, graphics and sound.
\$21.95



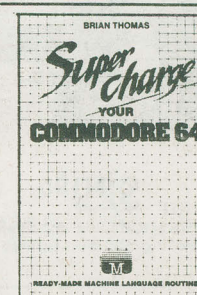
Commodore 64 Games Book
Teach your C64 every trick in the book. 30 programmes ranging from nerve shattering space games to a real life adventure. "For A C64 games enthusiast this is a must" — Personal Computer News.
\$21.95



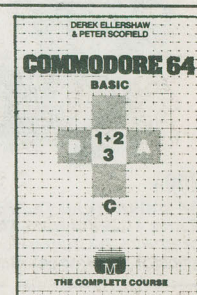
C64 Games Book, II
30 more programmes of the same high quality. Learns sophisticated programming routines and play fast arcade games. Includes unique Chexsum feature for verifying correct programme entry.
\$19.95



Commodore 64 Software Projects
Create useful programmes while building knowledge about programming techniques. Consists of six chapters each devoted to a project and containing five to eight diagrams.
\$19.95

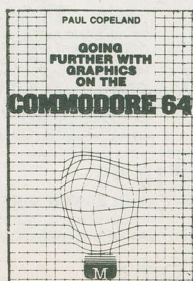


Supercharge your Commodore 64
Ready Made Machine Language Routines. Twenty five routines to expand your use of the C64's ability. Overcome the limitations of BASIC with more powerful graphics and sound.
\$22.95



Commodore 64 BASIC: The complete course
A highly structured learning tool, suitable for classroom use as well as home. Includes a special section for parents and teachers explaining topics in detail. Emphasis on exercise work for the learner.
\$37.95

Going Further with Graphics on the Commodore 64
A sophisticated software and book package. For intermediate to advanced programmers, create stunning graphics while eliminating much of the drudgery associated with graphics programming.
\$44.95



Commodore 64 Sound & Graphics
Concise, easy to follow instructions and sample programmes demonstrate how to create programmes with sprite and character design, music synthesis and many more.
\$19.95



C64 Machine Language for the Absolute Beginner
Write more powerful space saving programs or subroutines. Contains specific examples, and an entire programme — from design right through listing of an original arcade game.
\$19.95



Complete Maintenance Systems



C2050 \$27.95

KEYBOARD MAINTENANCE SYSTEM

A deluxe package including Aerosol Dust Blower, 4 oz. Keyboard Cleaning Solution, 12 Foam Swabs and 25 6" x 6" Multi-purpose Cloths to provide total keyboard maintenance. Boxed.

C2051 \$44.95

KEYBOARD-TV SCREEN-CRT MAINTENANCE SYSTEM

A total system containing 7 individual products including Screen and Keyboard Solutions, Dust Blower, Cloths, Screen Restorers and Swabs to eliminate static, restore optical clarity, polish and protect all areas of screens and keyboard. Boxed.

C2052 \$54.95

DATA CASSETTE TOTAL MAINTENANCE SYSTEM

Here are 9 individual products which clean screens, keyboards and work area; safely cleans data cassette heads with our wet computer head cleaner, and provides storage for up to 24 cassettes. Boxed.

C2053 \$57.95

DISK DRIVE TOTAL MAINTENANCE SYSTEM

Providing total maintenance for your disk drive system with 10 individual products including our reusable Disk Drive Head Cleaning System with solution, Screen and Keyboard Solutions, Cloths and a 10 diskette Home Storage Unit. Boxed.

Disk Drive Cleaning and Maintenance



C2004

DISK DRIVE HEAD CLEANING KIT

Includes 4 "wet" system Disk Drive Head Cleaning Diskettes packed with 2-2 ounce Head Cleaning Solution Bottles and Applicator Eyedropper. Boxed.

\$29.95



\$7.99

C2013

DISK DRIVE HEAD CLEANING SOLUTION

Our specially formulated Solution in a 2 ounce bottle packed with Applicator Eyedropper for superior performance. Carded.

Covers Protect your Investment

KEYBOARD COVERS

C7000 - Fits Atari 400 \$13.95

C7001 - Fits Atari 800 \$17.95

C7002 - Fits Apple II, IIE \$17.95

C7003 - Fits Apple III \$19.95

C7004 - Fits Commodore VIC 20/64 \$13.95

C7005 - Fits Radio Shack TRS-80II \$13.95

C7006 - Fits Texas Instruments 99/4A \$13.95

C7007 - Fits Atari 1200XL \$16.95

C7008 - Fits IBM PC \$13.95

DISK DRIVE COVERS

C7050 - Fits Atari 810 \$17.95

C7051 - Fits Commodore VIC-1540 \$15.95

C7052 - Fits T.I. PHP-1850 \$15.95

PRINTER COVERS

C7100 - Fits Atari 1025 \$16.95

C7101 - Fits Commodore VIC-1515 \$14.95

C7102 - Fits Commodore VIC 1525 and T.I. 17.95

C7104 - Fits Epson MX-80 \$17.95

C7105 - Fits Epson MX-100 \$19.95

SYSTEM COVERS

C7200 - Fits Coleco Adam (includes covers for keyboard, CPU and printer) \$29.95

C7201 - Fits DEC (includes covers for both keyboard and CPU) \$19.95

C7202 - Fits IBM PC JR (includes covers for both key board and CPU) \$22.95

Disk Storage



A C7520

\$17.99

5 1/4" DISKETTE MODULAR DESKTOP STORAGE

Dustproof, rigid, upright storage unit. Interlocking-modular design enables you to expand your software library in a neat and orderly manner. Translucent "computer blue" cover with attractive white base. Capacity 25 Diskettes.

B C7521

\$ 7.99

5 1/4" DISKETTE PORTABLE STORAGE

Compact unit offers portable, rigid protection for a software file. Upright access with dust-proof design. Capacity 10 Diskettes.

C C7522

\$7.99

5 1/4" DISKETTE TRAVEL FOLDER

Travel folder provides protection for that irreplaceable program. Anti-static, rigid flat design. Perfect for briefcase travel. Capacity 2 Diskettes.

NEW

\$14.95 each

No. 40-40C
Solid State Protector



Positive plug-in and low cost protection against transient voltages. It's a compact, rugged, reliable and very efficient device that protects computers, radios, home entertainment units, test equipment, etc. from those extremely brief but damaging voltage peaks. Completely passive at normal line voltage. Absorbs instantly the shock of line spikes or surges. 110 volts - 15 amps.

Schools & quantity buyers — 10 for \$135.

Don't charge it! Eliminate static ZAP



C2005
ANTI-STATIC
SPRAY

\$8.95

C2005
"WORK AREA" ANTI-STATIC SPRAY
A 12 ounce spray which treats approximately 175 feet to eliminate harmful static charges on carpets and computer work area.

\$21.95

C2008
ANTI-STATIC COMPUTER CLEANING CLOTHS
A package of 12 extra large 11" x 11" Anti-static Cleaning Cloths to neutralize static charges while removing dust from system housings and work area. Boxed.

C2003 \$10.95

DATA CASSETTE CLEANER w/REPLACEMENT PADS

A moving combination cleaning cassette for tape heads, capstan and drives with replaceable pads. Carded.

C2007 \$27.95

SOLID STATE DATA CASSETTE RECORDER HEAD DEMAGNETIZER

For use with all data recorders to eliminate harmful magnetic charge build-ups. Battery powered. Carded.

Data Recorder Cleaners



C2001 \$7.99

DATA CASSETTE RECORDER HEAD CLEANER

A Data Cassette Head Cleaner packed with a 1/2 ounce Cleaning Solution Bottle to remove harmful tape oxide, dust and other foreign particles from data head and capstan. Carded.

C2002 \$16.95

DATA CASSETTE RECORDER MAINTENANCE KIT

Contains 1 1/4 oz. bottles of Head Cleaning Solution and Lubricant, 8 - 5" Non-residue Foam Swabs and Inspection Mirror to clean data heads, rollers and guides. Boxed.

EDUCATIONAL ELECTRONIC ROBOT KITS

The **MOVIT** line is a series of computerized (and logic-controlled) battery robot kits that can teach the basic principles of robotic sensing and locomotion. Each of the kits features pre-assembled pc boards, hardware and mechanical-drive systems that can be handled by anyone. Only basic hand tools are required for assembly. These fascinating robots allow you to experience and learn any one of the following features: sound sensor, remote control, infra-red sensor, wired control and/or programmable memory. **MOVIT** line has provided the future with an innovative electronic educational kit. They are affordable robots that can entertain as well as educate. Now meet the family!

PIPER-MOUSE \$59⁹⁵

Save \$10.00

This is a Supersonic-Robot controlled by a supersonic sound sensor and an electronic circuit (one channel). Use the whistle attached to this kit and PIPER-MOUSE will follow your commands immediately turning to the left, stop, turning to the right, stop, advance and stop.

- Movement: 3 wheels driven by 2 DC motors
- Control: Supersonic sound sensor including condenser microphone & PC board
- Power source: 2 ea. AA batteries & 1 ea. 9V battery (not incl.)
- Color: blue.

MV-915 (Sound Sensor)



was
~~\$69⁹⁵~~

AVOIDER

An intelligent robot which knows how to avoid hitting walls. This robot emits an infra-red beam which detects an obstacle in front.

- Movement: 3 legs on each side by crank motion
- Control: Infra-red sensor includ. infra-red diode/photo diode/IC
- Power source: 4 ea. AA batteries & 1 ea. 9V battery (not incl.)
- Color: blue.

\$69⁹⁵

MV-912
(Infra-red Sensor)

Walks a straight line, but turns to avoid obstacles.

When this robot is about to hit a wall, just cry "Look Out!" The robot will immediately turn to the left.

TURN BACKER

- Movement: 3 legs on each side driven by crank motion
- Control: Sound sensor includ. condenser microphone & PC board
- Power source: 4 ea. AA batteries (not included)
- Color: blue.

Sound activated

MV-911
(Sound Sensor)

\$59⁹⁵

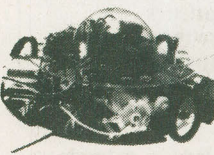
LINE TRACER II \$69⁹⁵

Follows a line

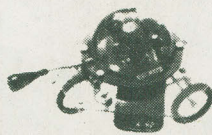
Guided by an infra-red light sensor this robot will automatically follow any black line drawn on white paper.

- Movement: 3 wheels driven by 2 DC motors
- Control: Infra-red sensor including infra-red diode/photo diode/IC
- Power source: 2 ea. AA batteries, 1 ea. 9V battery (not incl.)
- Color: yellow.
- How to play: Draw a black line on white paper board. Line width a minimum of 100 mm wide. Narrowest turning radius must be at least 15 cm.

MV-913 (Infra-red Sensor)



PEPPY



MV-916
(Sound/Touch Sensor)

- Power source: 2 ea. AA batteries (not included)
- Color: pink.

The PEPPY has a two-way sensor that is susceptible to noise and also to solid objects in its path. When the sensor located in front comes into contact with a wall or other obstacle or hears a loud noise, such as a hand clap, it will automatically turn to the left. The PEPPY, after contacting the wall, by reversing and at the same time turning to the left will turn through 90° to 180° and then resume its new course until it hits another object in its path. It is a new and exciting micro-age robot which is sure to give many happy hours to all the family.

\$39⁹⁵

\$49⁹⁵ MR. BOOTSMAN



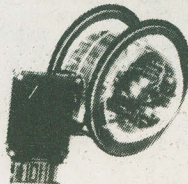
MV-931 (Wired Control)

- Power source: 2 each AA battery (not included)
- Color: blue.

Includes Joystick style control

The MR. BOOTSMAN has 6 insect-like legs, 2-speed movement, and includes a control box. The unique MR. BOOTSMAN can walk or run forwards or backwards, left or right, and when the leg movement on one side is reversed and the other side continues its forward action the MR. BOOTSMAN can execute 360° turns. You can use this robot for thrilling games of football or pushing matches, and you can even program your own games.

CIRCULAR



MV-935
(Remote Control)

\$139⁹⁵

The brand new CIRCULAR model has 2 large wheels which roll this super robot left and right, forward, or round and round. All the movements can be perfectly controlled by a hand-held remote control box. The CIRCULAR slips silently and smoothly along, making your friends stare in wonder. They must be asking themselves "How does it move?" It's a new robot from another age and can provide endless hours of amusement for all the children, and adults too!

- Power source (main body): 3 ea. AA batteries, 1 ea. 9V battery (not included)
- Control box: 1 ea. 9V battery (not included)
- Color: green.

MEMOCON-CRAWLER



Programmable Keyboard Detaches

NEW

\$119⁹⁵

NEW NAVIUS



MV-938

(Sensor/control pc board ready assembled, Infra-red Sensor)

\$79⁹⁵

Clever Robot moved reading the running command (white and black mark) by an infra-red sensor which you write in a disk. Use any drawing pencil (HB or B lead). It can be controlled by marking black at measure to move, forward, turning right or left and to stop. After the movement marked on the disk is over, it repeats the same movement.

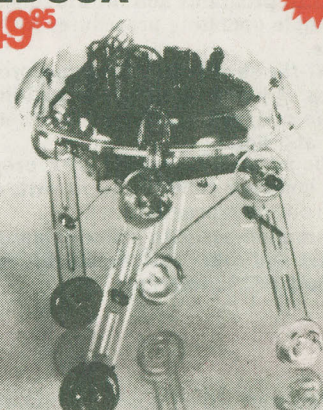
- Movement: Wheels, 2 motors.
- Control Method: Sensor/control circuit
- Sensor:.....infra-red sensor
- Element:.....Photo interlamp
- Control Circuit: IC + Transistors
- Power source: 2-1.5V AA batteries plus 1-9V battery (not included)
- Color: grayish green

You program movements on disk supplied

MEDUSA

\$49⁹⁵

NEW



MOVIT MEDUSA is a walking robot with an electronic brain. Registering your command, it is robot starts to hobble on its 4 legs and stops automatically after a preset time.

- Movement: 2 legs on each side by crank shaft
- Control: Sound sensor including condenser microphone/transistor
- Power source: 2 ea. 1.5V batteries N size (E90, MN9100) (not incl.)
- Color: clear.

MV-939 (Sound Sensor)

This robot is memory controlled through the keyboard included in this kit & runs as per the program you input using this keyboard. The keyboard has 5 different switches. The commands include: forward, to the right, to the left, pause, sound a buzzer and light up (LED). This robot employs a sequence function static RAM 256 x 4 bit memory.

- Movement: 3 wheels driven by 2 DC motors
- Control: Memory/electronics circuit (through the keyboard)
- Element: 4-bit static RAM
- Modes: Right, left, forward, pause, buzzer, beam (LED)
- 256 steps (no repeat steps) approx. 0.7-0.3 sec/1 step
- Power source: 2 ea. AA batteries, 1 ea. 9V battery (not incl.)
- Color: black.

MV-918 (Programmable Memory)

MEMOCON CRAWLER INTERFACE FOR COMMODORE 64

NEW

Now programme and control the Memocon Crawler from your Commodore 64. Price includes cable plus disk software!

MC164. **\$69.95**

THE PSION ORGANISER

A unique new invention that will change the way you work

Imagine how much more convenient and simple your life could be with a full-feature microcomputer — including screen, keyboard, mass storage and software in your pocket.

That's what THE PSION ORGANISER gives you — a uniquely versatile and innovative computing resource incorporating hybrid microprocessor technology more advanced and powerful than that found in micro computers twenty times the price!

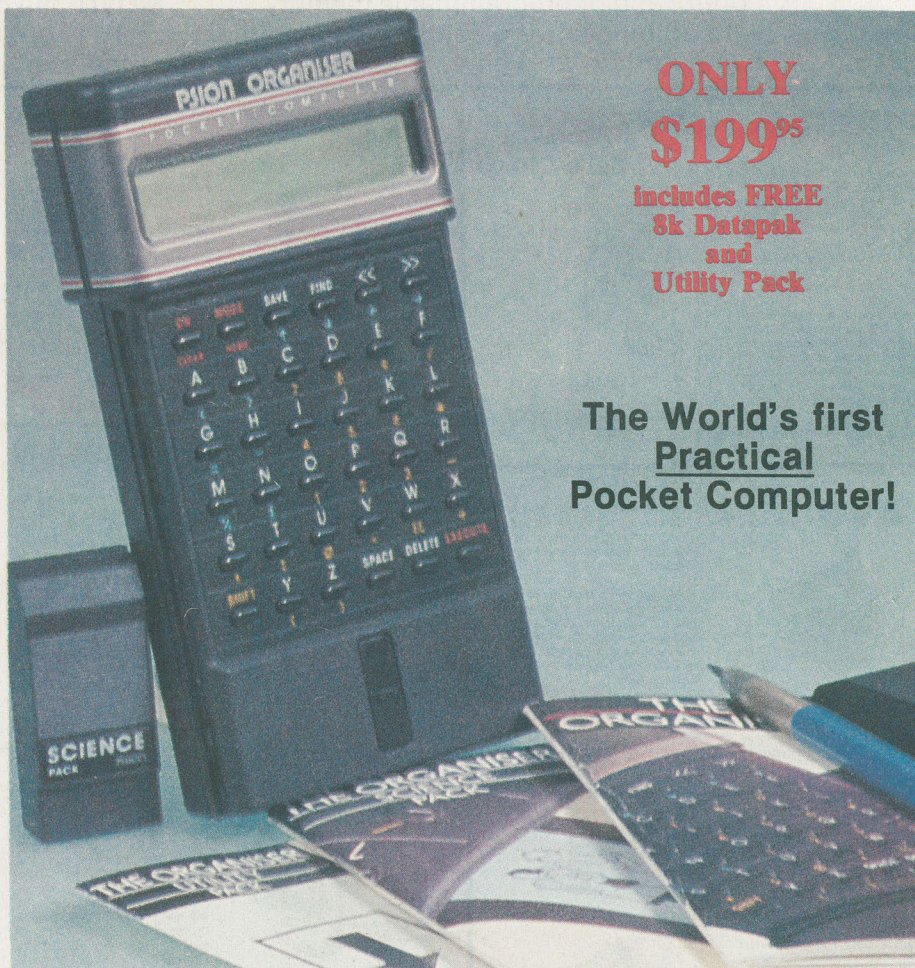
A UNIQUE NEW INVENTION

Thanks to a Psion-pioneered breakthrough in solid-state drive technology, the ORGANISER's data program packs offer open-ended, failsafe storage and ultra-fast operation.

- Built-in data-base facility allows instant access to programs and information.
- Simple operating procedures for ease of use.
- Off-the-shelf software library provides a mass of powerful programs and information designed to solve problems at work and home.
- The purpose-designed POPL programming language enables you to write and save your own programs.
- Communicate with office computers, printers and other peripherals through a standard RS232 interface.

PACKED WITH EXCLUSIVE FEATURES

- Solid-state drives access information in milliseconds.
- Information stored on datapaks is totally secure. Datapaks may be removed from the Organiser and still retain their information. Datapaks are re-useable through formatting.
- Solid-state drives allow the open-ended use of software and data. There's no limit to the amount of information or variety of programs which can be slotted into the drives.
- Auto-switch off after 5 minutes and low power-consumption CMOS components give six months' life in typical use with standard 9V battery.
- 16 character alpha-numeric display with scrolling over a 200 character record with adjustable contrast.
- Includes an editable calculator. Lets you carry out complex calculations involving up to 200 characters and two levels of brackets. Using the editing facility you can amend your calculation during entry. Moreover, you can go back and edit both data and formulae after a calculation has been carried out allowing you to carry out "what if" analyses.



**ONLY
\$199⁹⁵**

**includes FREE
8k Datapak
and
Utility Pack**

**The World's first
Practical
Pocket Computer!**

THE PSION ORGANISER: IT'S LIKE HAVING A FILING SYSTEM IN YOUR POCKET

Forget about diaries, notebooks and the backs of old envelopes. THE PSION ORGANISER allows you to type in information as you want and file it away at the touch of a key for instant future reference.

Retrieving information is every bit as simple. Just type in a keyword, a few characters, or even a date or number. THE PSION ORGANISER will search out the appropriate records and display them on the LCD screen. The simple scrolling facility allows you to view an entire entry up to 200 characters long.

Entries can be easily amended and edited and, since all data is permanently stored, there is no danger of it being lost — even if the battery is disconnected. A choice of 8k or 16k datapaks is available for you to build up an infinitely large information base.

YOUR OWN PRIVATE DATABASE TO STORE PERSONAL INFORMATION AND RETRIEVE IT INSTANTLY

You can use the Organiser to sort all the vital day-to-day information you need —

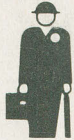
Names and addresses	Customer and supplier records
Meeting notes	Survey information
Schedules	Statistics
Important dates	Exchange rates
Expense details	Experimental data
Restaurants	Personal Reminders
Timetables	

- The special UTILITY PACK extends the power of the calculator even further with an extensive range of additional mathematical and scientific functions.
- Includes time and date clock function.
- Tough, protective sliding case.

Software and Communications for the PSION Organiser

SOFTWARE LIBRARY

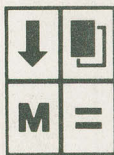
However simple or complex your computing requirements – the PSION ORGANISER can meet them – at work or in the home – with a range of ready-written software that you just plug in and run. Each program pack also contains an extended range of mathematical and scientific functions and POPL – the PSION ORGANISER Programming Language. Three packages are already available and more are on the way soon:



FINANCE

MORTGAGE: Monthly repayments
CASH FLOW: Net present value
 Internal rate of return
INVESTMENT: Bond redemption yield
 Equity price to earnings ratio estimates
COMPOUND INTEREST: Mortgage
 Payment
 Value
 Capital
 Duration
DEPRECIATION: Straight Line
 Reducing Balance
 Lifetime Estimate
BONDS AND EQUITIES: Bond redemption yield P/E estimate: Whitbeck-Kisor model.

\$79⁹⁵



BONUS!

UTILITY PACK

Further increases the power of the PSION ORGANISER'S calculator functions with a powerful range of additional mathematical and scientific functions.

LOG, ALOG, LN, SQRT, EXP, SIN, COS, TAN, ATN, ABS, INT, DEG, RAD, MOD, MIN, MAX, FAC, SGN, ROUND, MEAN, STDEV, PI, RND, RAND, ENG, FIX, POWER FUNCTION AND COPY.

FREE WITH EACH ORGANISER PURCHASED!

8K and 16K Datapaks

These remarkable data storage devices plug into the expansion slots on the back of the Organiser. The 8K datapak has a 10,900 character capacity and the 16K carries 21,800 characters of packed data. They will retain their data for up to 50 years at temperatures up to 100 degrees C. Each can be reformatted up to 100 times using the PSION formatter (or returned to factory for reformatting). The typical 'find' time for data is 5 seconds on a full 16K datapak. Datapaks can be 'copied' so it is easy to make information available to everybody in your company/school who also has an Organiser!

8K Datapack
\$34.95

16K Datapack
\$49.95

Formatter. Device to erase Datapack contents so they can be reused. **\$119.95**

Formatting service. \$10.00

SOFTWARE LIBRARY



MATHEMATICS

Valuable for the mathematician, the student and scientist – with a comprehensive range of facilities:

Bessel Polynomials Matrices
 – functions
 – solutions to equations
 – solution to matrix equations
 Eigenvalues
 – under a curve
 – least squares
 – mean
 standard deviation Chi-squared

\$79⁹⁵



SCIENCE

A suite of science programs suitable for a wide variety of applications.

Physical Constants – Planck, electron mass, electron charge, Rydberg, Gravitation, Avogadro, speed of light, sound, Gas constant, permeability, permittivity, earth radius, Bohr radius, Astronomic unit, etc.
Conversion Factors – UK to MKS etc.
Formulae – LC circuit, Lenses, Bohr energy levels, Larmor, plasma, etc.
Integration Under a Curve
Least Square Fit
Solution of Polynomial Equations

\$79⁹⁵

PERSONAL PROGRAMMING

POPL – A POWERFUL AID TO PERSONAL POCKET COMPUTING
 POPL – (PSION ORGANISER Programming Language) has been purpose designed for the organiser, and enables you to write, store and run your own programs.

With POPL you can customise the PSION ORGANISER to exactly match your own requirements – whether you simply need to store basic and repetitive calculations for day to day application or need to create a sophisticated program for later use.

Contained within the Finance, Maths and Science packs, POPL is built around a set of simple commands such as IN, OUT and GOTO and has a versatile line Editor.

POPL is a modular programming language, based on procedures which can be combined and cross referenced. Even the most complex and ambitious tasks can be split down into a series of discrete and manageable elements. This approach is highly flexible and enables you to write complex programs easily and quickly.
CREATE PROGRAMS AS INDIVIDUAL AS YOUR PROBLEMS.

When any of the three program packs is plugged into the ORGANISER the MODE key provides options additional to those found in the base machine:

CAT Lists all programs and procedures held in the program pack and datapak, if there is one plugged into the other 'Solid-state drive'
RUN Either a ready written program or one of your own stored in a datapak.

PROG Programming language.
COPY Transfer information from one datapak to another.

When the Programming Language option is selected a further range of facilities specific to POPL are available.

EDIT: For writing and editing procedures.

INSRT: Inserts a program line.

QUIT: Discards your current procedure.

EXIT: Takes you out of PROG and carries the procedure into RUN.

SAVE: Copies an edited procedure into datapak for permanent retention and access.

ERASE: Erases a procedure from a datapak.

The comprehensive manual included with each program pack contains an extensive description of POPL and advice on its use. Sections include: Variables: INput, OUTput and Assignment. GOTO, Branching and Labels. Conditions: IF, AND, OR and NOT. Looping and Iteration. Globals and Arrays, STORE and RECALL. Calling procedures. Parameters and Error messages.

COMMUNICATIONS



The PSION ORGANISER is the world's first practical pocket computer – but its value doesn't end there.

With the LINK-UP industry standard RS 232 interface you can use your ORGANISER to communicate with other computers, modems, printers and other peripherals.

Through the interface you can easily and quickly transmit a wide variety of information to the ORGANISER for storage in a datapak and later reference. Equally you can use the ORGANISER for data collection; information can be communicated later on to another computer system for storage and processing, or printed out as a hard copy.

The LINK-UP pack contains two components – the ribbon cable pack which plugs into a 'solid-state drive', and a configuration module which plugs into the second drive of the ORGANISER to set the communication protocols, and which is then replaced by a datapak.

The parameters which can be set are extremely flexible and are selected by using the cursor keys to specify screen prompted options including:

BAUD RATE: 150 – 9600

PARITY: ODD, EVEN, MARK, SPACE, NONE

PROTOCOL: NOTE, RTS/CTS,

XON/XOFF

\$119⁹⁵



CONNECTS TO ANY RS-232 COMPUTER!

TECHNICAL INFORMATION

ORGANISER

Dimensions (with protective case closed)
 Length 142.0 mm
 Width 78.0 mm
 Depth 29.3 mm
Weight (without battery) 225 grams
Power Consumption (Milliwatts at 9V)
 Organiser Off 0.2 On 40.0
 Datapak access (during 'SAVE' or 'FIND')
 One datapak 500.0 Two 800.0
 Sixteen character alpha-numeric (dot-matrix) liquid crystal.
Display
 Keyboard 36 key comprising:
 Control: ON/CLEAR, MODE/HOME, FIND, SAVE, EXECUTE
 Editing: SHIFT, DELETE, SPACE, < and >
 Character: A to Z, 0 to 9, arithmetical symbols and punctuation.
 Significance selected with SHIFT.
Microprocessor HD63012 eight-bit CMOS microprocessor chip with 0.9216 MHz clock. (3.6864 MHz crystal frequency source), 2 Timers, serial interface, 53 I/O lines, 80 pin LSI.
Memory Total 1K with one datapak
 Rom 4K (internal to microprocessor)
 RAM 2K
 EPROM 8K (datapak)
Clock CMOS real time clock with 32768 Hz crystal frequency source.

DATAPAKS

Capacity	8k	16k	Characters of packed data
	10,900	21,800	
FIND times	2.5	5	(with full datapak)
Average (sec)	5	10	
SAVE time	4-8 characters per second, according to battery age		
Data Retention	50 years at temperatures up to 100°C (MTTF)		
Storage Medium	EPROM (Erasable programmable read only memory)		
Formatting	30 minutes in PSION FORMATTER prepares datapak for re-use		
Life	Can be formatted up to 100 times		
Dimensions	Length 53 mm Width 26 mm Depth 13 mm 20 grams		

PROGRAM PACKS

Contents 16k of facts, formulae and procedures for specialist applications.
 Programming language.

Storage Medium ROM

Dimension and Weight As for datapaks

FORMATTER

Operation Formats 1 or 2 datapaks in 30 mins. (auto-timer control)

Dimensions Length 190 mm

Width 95 mm

Depth 65 mm

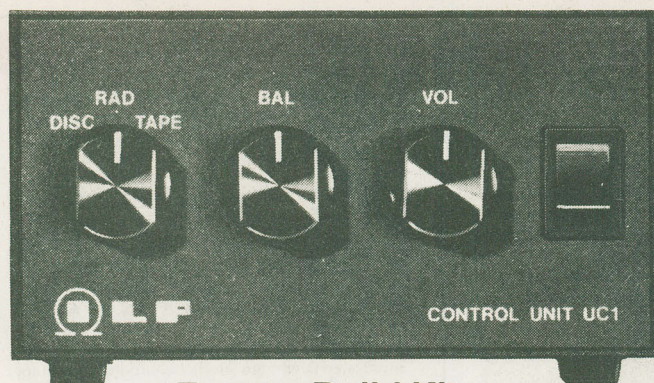
Weight 975 grams

Voltage 220-240 ac

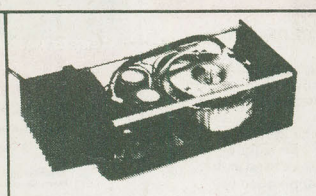
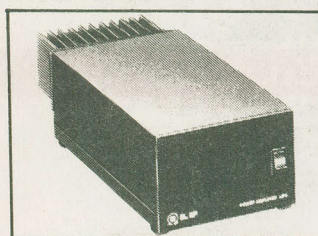
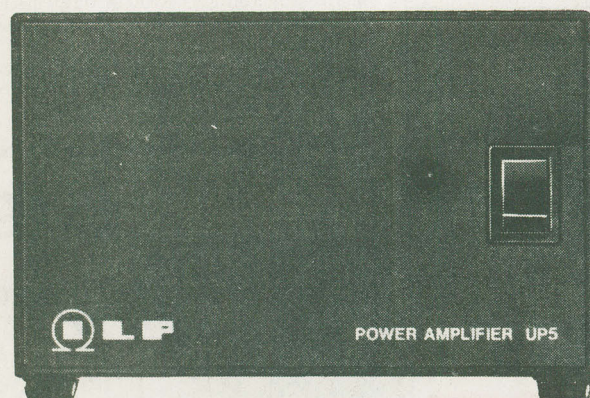
Power Consumption 6 watts

PSION has a policy of continuous product development and improvement. Small modifications arising from this are not necessarily included in this technical information.

ILP HIGH FIDELITY KITS



Easy to Build Kits



Featuring ILP Modules

ILP TOROIDAL TRANSFORMERS

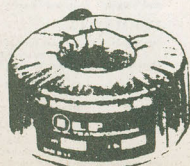
THE TOROIDAL POWER TRANSFORMER

Offers the following advantages —

- SMALLER SIZE AND WEIGHT TO MEET MODERN "SLIMLINE" REQUIREMENTS.
- LOW ELECTRICALLY INDUCED NOISE DEMANDED BY COMPACT EQUIPMENT.
- HIGH EFFICIENCY ENABLING CONSERVATIVE RATING WHILE MAINTAINING SIZE ADVANTAGES.
- LOWER OPERATING TEMPERATURE.



*Quantity discounts available



UC1 Stereo Preamplifier **only \$99⁹⁵**

A compact, high performance stereo control unit; elegant and sleek in appearance, with all the most desired features in a state-of-the-art preamp.

Has inputs for magnetic cartridge, tuner and tape/monitor facilities. This unit provides the heart of the ILP hi fi system and can be used in conjunction with any of the ILP series of power amps.

Power Source: Connects directly to any UP series power amplifier. In other applications, requires unregulated dc supply voltages of between ± 15 v and ± 30 v., or 20 mA current consumption.

Frequency response	(-3 db) 15 Hz - 50 kHz
Total harmonic distortion	0.01% (typical at 1 kHz)
Intermodulation distortion	0.006% (7 kHz 4:1)
Signal / noise ratio	100db
Slew rate	15 v / μ s
Rise time	5 μ s
Input impedance	100 K ohm
Input sensitivity	500 mv
Damping factor (at 100 Hz)	400

Amplifiers

- Feature use of preassembled, tested audio power modules
- Toroidal power transformer produces lower noise, weighs far less

ILP power amplifiers represent an excellent choice for the tops in performance, low price, compact size and ease of assembly.

All ILP power amplifiers feature ILP audio power modules, factory assembled and pretested to ensure long term trouble — free operation. In addition, ILP toroidal transformers reduce noise within the amplifier to insignificant levels, while reducing the weight to half that of comparable systems.

BIPOLAR POWER AMPS

	Power	Impedance		Price
UP10	30W + 30W	4 - 8 ohm	Stereo	\$199.95
UP20	60W	4 ohms	Mono	199.95
UP30	60W	8 ohms	Mono	199.95
UP40	120W	4 ohms	Mono	259.95
UP50	120W	8 ohms	Mono	259.95

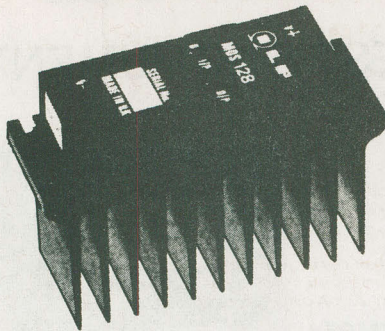
MOSFET POWER AMPS

	Power	Impedance		Price
UP60	60W	4 - 8 ohms	Mono	\$229.95
UP70	120W	4 - 8 ohms	Mono	\$299.95

TYPE	RMS VOLTS	RMS CURRENT	TYPE	RMS VOLTS	RMS CURRENT	TYPE	RMS VOLTS	RMS CURRENT
30VA			120VA			300VA		
1A010	6 + 6	2.50	4A011	9 + 9	6.66	7A016	25 + 25	6.00
1A011	9 + 9	1.66	4A012	12 + 12	5.00	7A017	30 + 30	5.00
1A012	12 + 12	1.25	4A013	15 + 15	4.00	7A018	35 + 35	4.28
1A013	15 + 15	1.00	4A014	18 + 18	3.33	7A026	40 + 40	3.75
1A014	18 + 18	0.83	4A015	22 + 22	2.72	7A025	45 + 45	3.33
1A015	22 + 22	0.68	4A016	25 + 25	2.40			
1A016	25 + 25	0.60	4A017	30 + 30	2.00			
1A017	30 + 30	0.50						
Size 2.75 Dia x 1.18 (70 mm Dia x 30 mm)			Size 3.5" Dia x 1.56" (90 mm Dia x 40 mm)			Size 4.3" Dia x 1.95" (110 mm Dia x 50 mm)		
Weight 1 lb (0.45 Kg)			Weight 2.6 lbs (1.2 Kg)			Weight 5.72 lbs (2.6 Kg)		
\$29.50			\$36.50			\$57.50		
50VA			160VA			500VA		
2A010	6 + 6	4.16	5A012	12 + 12	6.66	8A017	30 + 30	8.33
2A011	9 + 9	2.77	5A013	15 + 15	5.33	8A018	35 + 35	7.14
2A012	12 + 12	2.08	5A014	18 + 18	4.44	8A026	40 + 40	6.25
2A013	15 + 15	1.66	5A015	22 + 22	3.63	8A025	45 + 45	5.55
2A014	18 + 18	1.38	5A016	25 + 25	3.20	8A033	50 + 50	5.00
2A015	22 + 22	1.13	5A017	30 + 30	2.66			
2A016	25 + 25	1.00	5A018	35 + 35	2.28			
2A017	30 + 30	0.83						
Size 3.12" Dia x 1.37" (80 mm Dia x 35 mm)			Size 4.3" Dia x 1.56" (110 mm Dia x 40 mm)			Size 5.5" Dia x 2.35" (140 mm Dia x 60 mm)		
Weight 2 lbs (0.9 Kg)			Weight 4 lbs (1.8 Kg)			Weight 8.8 lbs (4.0 Kg)		
\$32.00			\$42.50			\$78.95		
80VA			225VA			625VA		
3A010	6 + 6	6.64	6A014	18 + 18	6.25	9A017	30 + 30	10.41
3A011	9 + 9	4.44	6A015	22 + 22	5.11	9A018	35 + 35	8.92
3A012	12 + 12	3.33	6A016	25 + 25	4.50	9A026	40 + 40	7.81
3A013	15 + 15	2.66	6A017	30 + 30	3.75	9A025	45 + 45	6.94
3A014	18 + 18	2.22	6A018	35 + 35	3.21	9A033	50 + 50	6.25
3A015	22 + 22	1.81	6A026	40 + 40	2.81	9A042	55 + 55	5.66
3A016	25 + 25	1.60						
3A017	30 + 30	1.33						
Size 3.5" Dia x 1.17" (90 mm Dia x 30 mm)			Size 4.3" Dia x 1.76" (110 mm Dia x 45 mm)			Size 140 x 75 mm		
Weight 2.2 lbs (1 Kg)			Weight 4.85 lbs (2.2 Kg)			Weight 5.0 Kg		
\$34.50			\$48.50			\$89.50		
ALL VOLTAGES ARE QUOTED FULL LOAD. Please add regulation figure to secondary voltage to obtain off load voltage								



POWER AMPLIFIER MODULES

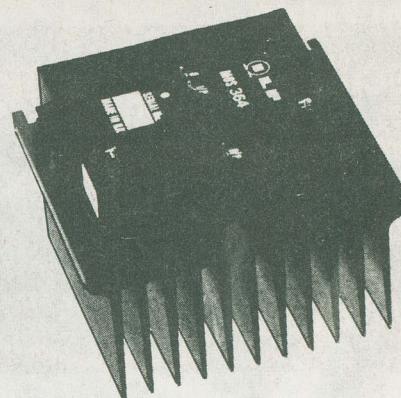
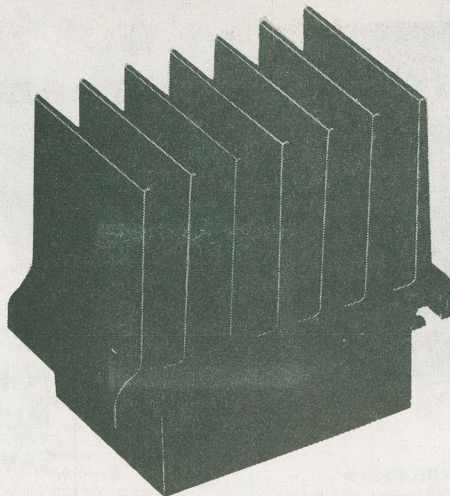


MOSFET SERIES.

These high quality power amplifiers utilize the very latest technological development in the audio field — the MOSFET. Superior performance characteristics can be achieved by using these devices in the output stage of the amplifiers, a comparison to which can only be demonstrated by the most sophisticated and expensive designs using bipolar devices. They provide faster slew rate and complete absence of crossover distortion. Their inherent positive temperature coefficient makes them immune to thermal runaway, hence eliminating the need for complicated protection circuitry which often contributes to distortion. Also they have the ability to operate into complex loads without difficulty, therefore making them suitable for many audio applications. The amplifiers are encapsulated to fully adequate heatsinks and connections are made via five easily soldered terminations.

BIPOLAR SERIES.

These modular hybrid amplifiers have been designed to provide the utmost in high fidelity performance. Encapsulation to an integral heatsink, together with internal safeguards to ensure full protection, make them both mechanically and electrically extremely rugged and therefore suitable for all audio applications. Connections are made simply and quickly by only five soldered terminations: input, output, positive supply, negative supply and earth.



- * Built in Heatsinks
- * Only five connections

MOSFET MODULES

Module Number	Output Power Watts rms	Lead Impedance Ω	DISTORTION T.H.D. Typ at 1KHz	I.M.D. 60Hz 7KHz 4:1	Supply Voltage Typ	Size mm	WT gms	PRICE EACH
MOS128	60	4-8	0.005%	0.006%	± 45	120 x 78 x 40	420	\$119.95
MOS248	120	4-8	0.005%	0.006%	± 55	120 x 78 x 80	850	154.95
MOS364	180	4	0.005%	0.006%	± 55	120 x 78 x 100	1025	229.95

Protection: Able to cope with complex loads without the need for very special protection circuitry (fuses will suffice).
Slew rate: 20v ps. Rise time 3ps S/N ratio 100db
Frequency response (-3dB): 15Hz — 100KHz. Input sensitivity 500mV rms
Input impedance: 100K Damping factor: 100Hz : 400

BIPOLAR MODULES

Module Number	Output Power Watts rms	Lead Impedance Ω	DISTORTION T.H.D. Typ at 1KHz	I.M.D. 60Hz 7KHz 4:1	Supply Voltage Typ	Size mm	WT gms	PRICE EACH
HY30	15	4-8	0.015%	0.006%	± 18	76 x 68 x 40	240	34.95
HY60	30	4-8	0.015%	0.006%	± 25	76 x 68 x 40	240	34.95
HY6060	30 + 30	4-8	0.015%	0.006%	± 25	120 x 78 x 40	420	74.95
HY124	60	4	0.01%	0.006%	± 26	120 x 78 x 40	410	59.95
HY128	60	8	0.01%	0.006%	± 35	120 x 78 x 40	410	
HY244	120	4	0.01%	0.006%	± 35	120 x 78 x 50	520	79.95
HY248	120	8	0.01%	0.006%	± 50	120 x 78 x 50	520	
HY364	180	4	0.01%	0.006%	± 45	120 x 78 x 100	1030	
HY368	180	8	0.01%	0.006%	± 60	120 x 78 x 100	1030	119.95

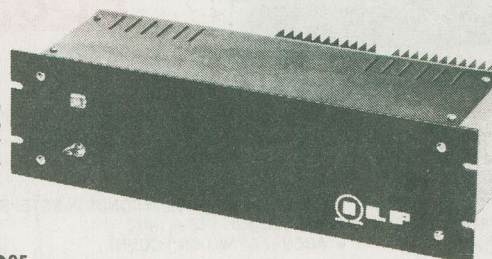
Protection: Full load line. Slew Rate: 15V ps. Risettime: 5ps. S/N ratio: 100db. Frequency response (-3dB) 15 Hz — 50KHz. Input sensitivity: 500mV rms. Input Impedance: 100K Damping factor: 100Hz : 400.

ILP PART No.	FOR USE WITH	Code - Part#	Each
PSU210	1 or 2 HY30	TR 20045 PCB 210	24.95
PSU410	1 or 2 HY60, 1 x HY6060	TR 40027 PCB 410	36.50 24.95
PSU420	1 x HY128	TR 40040 PCB 420	36.50 32.95
PSU430	1 x MOS128	TR 40041 PCB 430	36.50 36.95
PSU510	2 x HY128, 1 x HY244	TR 50020 PCB 510	42.50 32.95
PSU520	2 x HY124	TR 50027 PCB 520	42.50 32.95
PSU530	2 x MOS128	TR 50034 PCB 530	42.50 36.95
PSU540	1 x HY248	TR 50019 PCB 540	42.50 36.95
PSU550	1 x MOS248	TR 50035 PCB 550	42.50 44.95
PSU710	2 x HY244	TR 70047 PCB 710	57.50 38.95
PSU720	2 x HY248	TR 70019 PCB 720	57.50 42.95
PSU730	1 x HY364	TR 70017 PCB 730	57.50 42.95
PSU740	1 x HY368	TR T.B.A PCB 740	57.50 50.95
PSU750	2 x MOS248, 1 x MOS368	TR 70036 PCB 750	57.50 50.95
PSU760	2 x HY364	TR 8A017/S PCB(2) 740	79.95 42.95
PSU770	2 x HY368	TR 8A026/S PCB(2) 740	79.95 50.95
PSU780	2 x MOS364	TR 9A036/S PCB(2) 750	89.95 50.95

Please Note: Each Power Supply Unit (PSU) stocked and sold as two separate components, namely the Transformer (TR) and the Printed Circuit Board (PCB). If you are ordering a complete power supply, be sure to order one of each, by part number.

PROFESSIONAL ATTRACTIVE CABINET FOR ILP AMPLIFIERS

A new design 19" rack-mount cabinet for ILP modules provides the ultimate in appearance, convenience and flexibility in mounting/using ILP amplifiers. Include everything you need, down to nuts and bolts, for quick/easy assembly. Hold two amplifiers plus matching power supplies. Type A1905 For HY244, HY248. Type B1905 For MOS248. Type C1905 For HY364, HY368, MOS364

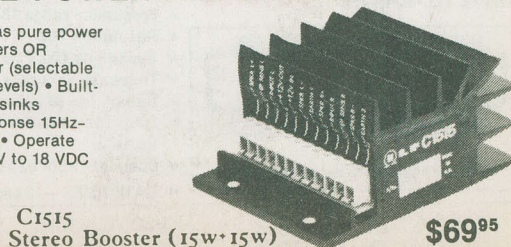


12 VOLT AUTOMOTIVE POWER AMPLIFIERS



C15
Mono Booster (15W)

\$39⁹⁵



C1515
Stereo Booster (15W+15W)

\$69⁹⁵

- Use as pure power amplifiers OR booster (selectable input levels)
- Built-in heatsinks
- Response 15Hz-30KHz • Operate from 8V to 18 VDC

SC110 a low power portable Oscilloscope



\$480⁰⁰

Ultra low power consumption

The SC110 is based around a 2" diagonal CRT which requires extremely low power both in the heater and in the deflection circuits. This, combined with specially developed circuitry which automatically shuts down unwanted sections of the instruments, means that the SC110 can operate for very long periods on low cost disposable batteries as well as rechargeables. In the standby mode, power drain is typically 350 milliwatts.

Superb Ergonomic design

The SC110 has a similar front panel layout to a high cost bench oscilloscope. Timebase speed and Y-sensitivity are set by simple, clear, rotary switches. Function and trigger controls are positive, unambiguous push-buttons. The screen graticule is divided into 5 x 4 divisions, and the trace is bright and sharp.

A light, slim but tough package

The weight of the SC110 has been kept to a minimum. Even with the heaviest disposable batteries fitted it weighs under 2 1/2 lbs. Despite the clear and easy to operate controls, the size has also been minimized and the complete oscilloscope is under 2 inches thick. The result is an instrument that can be taken anywhere, slips unobtrusively into a briefcase or toolkit, can be held in one hand, or operated whilst slung around the neck, in the optional carrying case.

Specifications:

DISPLAY: 32 x 36 mm blue-white, medium persistence, 5 horizontal x 4 vertical divisions. Adjustments: intensity, focus, trace rotate.

VERTICAL DEFLECTION (Y input). 10mv/div to 50V/div in 12 ranges. Bandwidth D.C. to 10 MHz 3 db at 1 div. 1 Megohm input impedance. Maximum input 350V (DC & A.C. peak)

HORIZONTAL DEFLECTION (X input) — switch selectable. 0.5V/division sensitivity. Bandwidth D.C. to 2 MHz 6 db. Maximum input 2.5V, protected to 250V rms.

TIMEBASE — switch selectable. Sweep times, 0.1 uS to 0.5 secs/division in 21 ranges. Calibration accuracy 3%.

TRIGGERING CIRCUIT. Internal or external switchable. Coupling, A.C., D.C. T.V. frame, or T.V. line.

Full-sized performance

The SC110 has a 10MHz bandwidth and sensitivity down to 10mV per division. Full trigger facilities are provided, including Bright Line and Auto with TV Line and Frame filtering.

SC-110 ACCESSORIES:

CARRYING CASE	\$27.95
A.C. ADAPTOR	\$16.95
DUAL PROBE (X1-X10)	\$39.95

thandar TEST INSTRUMENTS



MODEL TM354

PORTABLE MULTIMETER

SAVE \$21.00

\$99.95

FORMERLY SOLD FOR \$121.00

- ★ Pocket size
- ★ 14 ranges
- ★ 3 1/2 digit 0.5" LCD
- ★ Battery life >2000 hours

Measurement capability:

DC volts	: 1mV to 1000V
AC volts	: 1V to 500V AC rms
DC current	: 1uA to 2A
Resistance	: 1Ω to 2MΩ

Accuracy: The quoted accuracy specifications are for the temperature range 18°C - 28°C and are maintained for typically 1 year. For temperatures in the range 5°C - 18°C and 28°C - 40°C the accuracy specification is typically degraded by <0.1 x the applicable accuracy specification per °C.

Display: 3 1/2 digit 0.5" LCD with polarity and overrange indication.

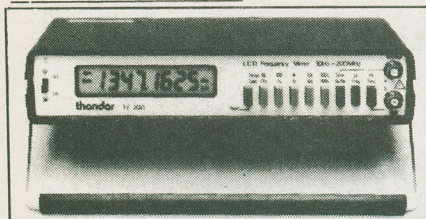
Overrange Indication: '1' shows in MSD, with all other digits suppressed.

Maximum Common Mode Voltage: 500V DC or AC peak.

Power Requirements: One 9V alkaline or zinc carbon battery.

Battery Life: Typically >2000 hours from a 9V alkaline battery such as Mallory MN1604

MODEL TF 200 **\$485.00**



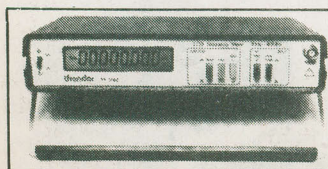
THANDAR FREQUENCY COUNTERS

- ★ Bench/portable
- ★ 8-digit Liquid Crystal Display
- ★ Frequency range 10Hz - 200MHz
- ★ Resolution better than 1ppm
- ★ Sensitivity typically 10mV rms
- ★ Timebase accuracy 0.3ppm
- ★ Battery life 200 hours

- ★ Frequency, time average period, totalize & reset; 2 ranges, 5 gate times; external clock facility
- ★ Complete with batteries
- ★ GATE TIME .01 - 100 SECONDS IN 5 STEPS
- ★ RESOLUTION 1HZ - 1KHZ
- ★ ACCURACY WITHIN 1 COUNT

MODEL TF-040

10Hz to 40MHz **\$340.00**



- ★ ACCURACY WITHIN 1 COUNT
- ★ Bench/portable
- ★ 8-digit Liquid Crystal Display
- ★ Frequency range 10Hz - 40MHz
- ★ Resolution 1Hz
- ★ Sensitivity 40mV rms
- ★ Timebase accuracy 0.5ppm
- ★ Battery life 80 hours
- ★ Frequency, totalize & reset; 2 gate times
- ★ Complete with batteries
- ★ GATE TIMES — .2 and 2 SEC

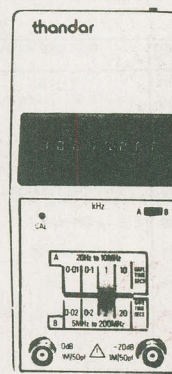
PRESCALERS FOR FREQ. COUNTERS

TP600 600 MHz	\$139.00
TP1000 1GHz	185.00

MODEL PFM 200A

- ★ Timebase accuracy 2ppm
- ★ Pocket Size
- ★ 8-digit L.E.D. Display
- ★ Frequency range 20Hz - 200MHz
- ★ Resolution 0.1Hz
- ★ Sensitivity typically 10mV rms

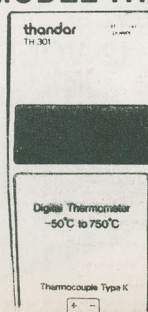
\$210.00



MODEL TH301

DIGITAL THERMOMETER

- ★ Pocket size
- ★ -50°C to 750°C range **\$180.00**
- ★ 1°C resolution
- ★ 0.5" LCD
- ★ >1000 hour battery life

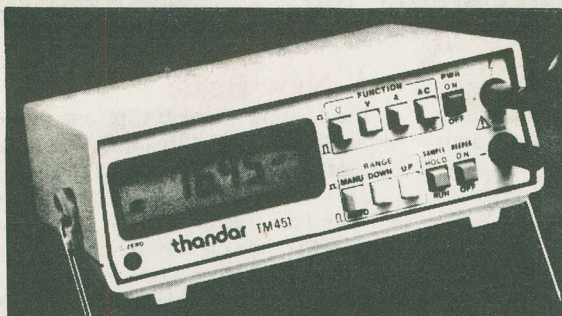


TH302 DIGITAL THERMOMETER \$244.00

Pocket sized, measures from -40°C to 1100°C. Both models supplied complete with naked bead thermocouple and batter. Accept any K type probe.

thandar test equipment

4 1/2 DIGIT MULTIMETER



- ★ Bench/Portable
- ★ 4 1/2 digit 0.4" LCD,
- ★ 0.03% basic accuracy
- ★ Full auto-ranging or manual
- ★ Sample hold
- ★ Audible continuity test
- ★ Complete with battery and test leads

\$455⁰⁰ save \$50.00

TM451
was
\$495⁰⁰

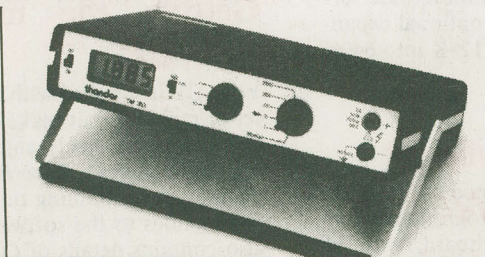
Accuracy:	Basic Accuracy ± (0.1% of reading)
Battery Life:	70 hours from 9v Battery
Size:	155 x 120 x 57mm
Weight:	585 g. (including Battery)
DC and AC Volts:	200mV to 1000V
DC and AC Currents:	200mA to 1A
Resistance:	1 to 20M

3 1/2 DIGIT METERS

LABORATORY ACCURACY
FOR BENCH OR ON THE GO

**MODEL
TM 356**

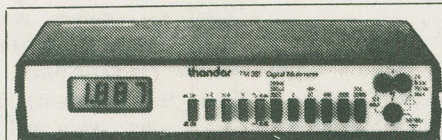
\$269⁰⁰



- 26 ranges
- Battery life typically >3000 hours
- Complete with batteries and test leads
- ★ Bench/Portable
- ★ 3 1/2-digit 0.5" LCD
- ★ 0.25% basic accuracy

**TM 351
\$325⁰⁰**

- ★ Bench/Portable
- ★ 3 1/2-digit 0.5" LCD
- ★ 0.1% basic accuracy
- ★ 29 ranges



- ★ Battery life typically >2000 hours
- ★ Complete with batteries and test leads

SPECS MODEL TM 351 TM 356

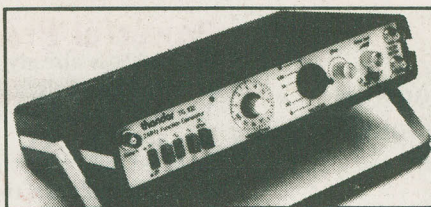
ACCURACY	BASIC ACCURACY ± (0.1%)	BASIC ACCURACY ± (0.25%)
BATTERY LIFE	2000 HOURS	3000 HOURS
SIZE	255 x 150 x 50mm	255 x 150 x 50mm
WEIGHT	1200g (Batteries included)	1200g (Batteries included)
DC VOLTS	200 mV to 1000 V	200 mV to 1000 V
AC VOLTS	200mV to 750 V	200mV to 750 V
DC current	200 uA to 10 A	200 uA to 2 A
AC current	200 uA to 10 A	200 uA to 2 A
RESISTANCE	200 to 20 M	2K to 20 M

THANDAR GENERATORS

★ 0.2Hz to 2MHz
Function Generator

\$490⁰⁰

TG 102

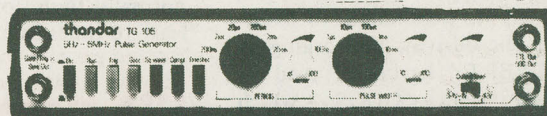


- 0.2 Hz to 2MHz in 6 RANGES
- FINE Adjustment by calibrated VERNIER
- EXTERNAL SWEEP MODE

- SINEWAVE, TRIANGLE, SQUARE WAVE & DC OPERATING MODES
- VARIABLE 50 and TTL output
- MAXIMUM INPUT ± 10V
- 0.2Hz to 2MHz Function Generator
- Sine, Square Triangle Waveforms
- Variable DC offset
- Variable 50 output TTL output
- External Sweep Mode

TG102 2MHz FUNCTION GENERATOR

Frequency:	< 0.2Hz to 2MHz
Functions:	Sine, Square, Triangle and DC from variable 50Ω output. External sweep: ≥ 1000:1 linear range.
Outputs:	60mV-20V from variable 50Ω output; variable DC offset to ± 10V. TTL output.
Power Requirements:	120V or 240V AC (nominal) 50/60Hz
Size & Weight:	255 x 150 x 50mm : 1200gms

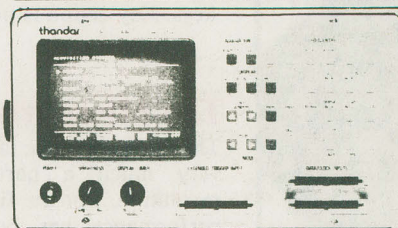


TG 105 Pulse Generator \$335.00

- ★ 5Hz to 5MHz Pulse Generator
- ★ Free-Run, Gated or Triggered Modes
- ★ Squarewave, Complement
- ★ Variable 50Ω output
- ★ TTL output
- ★ Sync output

TG105 5MHz PULSE GENERATOR

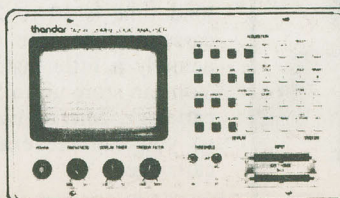
Period:	200nsec to 200ms (5MHz to 5Hz)
Pulse Width:	100nsec to 100ms, independent of period.
Operating Modes:	Run, Triggered, Gated, One Shot, Square Wave and Complement
Outputs:	0.1V to 10V variable 50Ω output; Separate TTL output; Sync. output
Power Requirements:	120V or 240V AC (nominal) 50/60Hz
Size:	255 x 150 x 50mm
Weight:	1200gms



TA2160

New Lower Prices
Thandar
Logic Analyzers
from \$3995
Call or write
for details

LOGIC ANALYSERS



TA2080

- TA2080 8 channel 20MHz logic analyser; timing and state display; 23 bit triggering; 252 word memory.
- TA2160 16 channel 20MHz logic analyser; timing and state display; 34-bit 2 level triggering; 252 word memory; RS232 interface.
- TA232P serial pod for data capture on asynchronous serial communication links.

Gladstone Electronics, 1736 Avenue Road, Toronto, Ontario M5M 3Y7 Toll Free Order Line 1-800-268-3640

Sinclair QL

The most exciting new computer of the 1980's

State of the art hardware PLUS incredible software included at no extra cost!

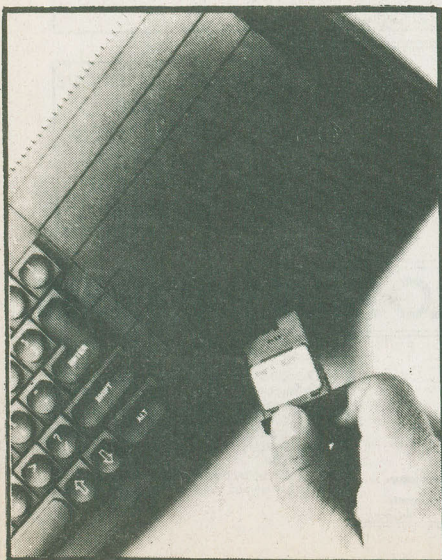
only \$799⁹⁵
Including
Professional
Software

- * 32-bit processor
 - * 128K memory
 - * two built-in microdrives
 - * high resolution colour
- Includes software:**
word-processing
database management
spreadsheet
graphics

The Sinclair QL revolutionizes the computer revolution. It offers the utmost in performance, speed and power at the remarkably low price of only \$799.95.

The QL is a full-size computer designed around the most powerful and advanced microprocessor yet created for the personal computer: the Motorola 68008. With 128K RAM, expandable to 640K. Two built-in Microdrives. Networking. A full-sized QWERTY keyboard. And its own operation system — QDOS — which accommodates windows and even multi-tasking. High resolution colour or black and white display, on either monitor or TV. Two RS-232C serial interfaces. Joystick cursor control.

That's just the hardware. The QL also comes with all the software you need to get started right away doing useful work. Word processing. Spreadsheet. Graphics. Database management. A powerful set of programs as sophisticated and as easy to use as any on the market.



Powerful Processors

The 68008 is already the favourite choice of software designers for its speed and flexibility. Its 32-bit architecture virtually guarantees the QL will never become outdated, and that wide software choices will be available in the future.

A second processor, an Intel 8049, controls the keyboard, generates the sound, and acts as an RS-232 receiver.

New Operating System

QDOS resides within the QL's 32K ROM. It is a single-user multi-tasking, time-sliced system using Sinclair SuperBASIC as a command language. Multi-tasking allows you to run several programmes individually and simultaneously, a feature normally found on computers costing at least 10 times as much as the QL.

128K Memory Expandable

The QL comes with a generous 128K of internal RAM, more than enough for the largest programmes you'll want under ordinary circumstances. An optional expansion board can turn your 128K into 640K simply and inexpensively.

Professional Keyboard

The QL keyboard is designed for fast, accurate input of data and programmes. It is a full-size QWERTY keyboard, with 64 keys, including shift keys, five function keys, and four separate cursor control keys. Key action is positive and precise.

The Microdrives

The QL's cartridge tape storage system is very much a part of the Sinclair revolution. For the first time floppy disk performance has been matched in a compact medium far less expensive to own. Depending on programme length, load time is 10 to 20 times faster than cassette. The rate of data transfer is actually a little faster than floppy disk. You can store up to 50 files, or 100K, per cartridge. Microdrive maintains an index so you can see exactly what's on any cartridge.

The QL has two built-in Microdrives, with expansion of up to six more.

A New Basic

The Sinclair SuperBASIC combines the familiarity of BASIC with a number of major developments which allows the QL's full power to be exploited. Procedure facility allows code to be written in clearly-defined blocks. Extendability allows new procedures to be added which will work in exactly the same way as the command procedure built into the ROM with which you're already familiar. Constant execution speed means SuperBASIC won't get slower as your programmes get larger. Instead, long programmes run much faster than with other Basics.

Incredible Extra Features

The QL features built-in networking capability for up to 64 QL computers. Set up local area networks of QL computers to swap information, ideas and programmes, shared over the network at 100K baud.

High resolution graphics? Up to 512 x 256 pixels (4 colour), 256 x 256 (8 colour). ROM expansion? The QL will accept an additional 32K ROM cartridge.

Getting the most from your QL

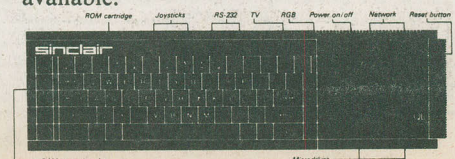
Your QL is supplied with a comprehensive set of manuals that make learning not only painless, but truly enjoyable. The QL manual includes a SuperBASIC reference manual, programming tutorial, and complete guides to the software. The manual also contains details of QL's comprehensive 90-day warranty, and service information.

Here is what you get:

Your QL comes with power supply, cables, manual, software and two blank microdrive cartridges.

Free QLUB Membership. As a Canadian QL owner, you will automatically be enrolled in QLUB, and receive about four newsletters giving hardware and software hints, applications, plus information on new products for your QL.

Free SOFTWARE upgrades. enhancements to your QL software are likely. You will be automatically entitled to receive these upgrades as they become available.



The Sinclair revolution continues: 32-bit processor architecture, 128K RAM, QDOS operating system, bundled professional software, for serious home and business users.

QL Hardware Specifications

System Configuration

Basic system for \$799.95 includes two processors, two custom designed control chips, 128K main memory (expandable), operating system programming language, full-size 65-key QWERTY keyboard, twin-QL Microdrives (100K-byte capacity each with 3.5 seconds average access time), four software programs on Microdrive cassette (word processing, spreadsheet, database management, graphics), blank Microdrive cassettes, power supply, connecting cables and adapters for TV monitor and LAN.

Hardware

RAM: 128K, expandable externally to 640K (32K dedicated for screen bit map)

ROM: 32K, contains Sinclair SuperBASIC and Sinclair QDOS operating system (expandable via ROM cartridge to 64K)

CPU: MOTOROLA 68008, running at 7.5 MHz, for all principal functions (Architecturally the 68008 is a 32-bit processor with an 8-bit data bus. One megabyte of non-segmented address space is available.)

INTEL 8049, a second processor, controls keyboard, sound, RS-232C receive and real-time clock functions

Custom Chips: Four Sinclair-designed ICs. The first controls display and memory, the second controls the Microdrives, the real-time clock, local area network and RS-232C transmission, the third and fourth provide analog functions required by the Microdrives

Video: High-resolution graphics capability with color/monochrome monitor (or TV) in two modes, 512 x 256 pixels (4-color), 256 x 256 pixels (8-color)

Normal character display format up to 85 x 25 with choice of character sets available, TV format up to 40 to 60 columns depending on software

Power Supply: 120 volts at 60Hz, 9v DC at 1.8 amps, 15.6v AC at 0.2 amps from transformer unit (19 watts to computer)

Mechanical Specifications

Dimensions: 5 1/8" x 1 1/4" x 18 1/4"
138 mm x 46 mm x 472 mm

Weight: 3.055 lbs (1388 gms.)

Software

Operating System: QDOS, developed by Sinclair. Key features include single user multiple tasking, time sliced priority job scheduler, file handling for multiple screen windows, device-independent input/output

Language: Sinclair SuperBASIC. Key features include procedure structuring, extensibility (including syntax), interpretation speed independent of program size, clean machine code interface, operating system facilities accessible from SuperBASIC, equal capability for strings and arrays, full-screen BASIC editor, full error-handling facilities

Communications

Serial: Two standard RS-232C communications interfaces for printers, modems, etc. Transmission at rates from 75-19,200 baud or full-duplex transmit/receive at seven rates up to 9600 baud. (Note: a parallel printer interface is under development as an optional extra.)

LAN: For up to 64 Sinclair QL computers, data transmission over the net at 100K baud

Expansion

Excluding RGB monitor and power sockets and the TV port, nine peripheral expansion ports are provided: internal expansion (1 port), Microdrive expansion (1), ROM cartridge (1), serial (2), local area network (LAN) (2), joysticks (2). For serial and LAN, see Communications

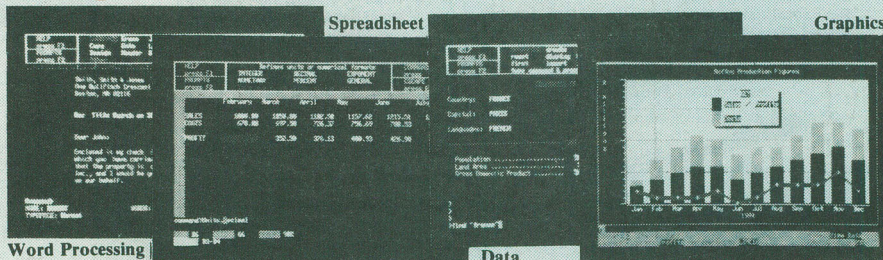
Internal: One megabyte of non-segmented address space is available for almost unlimited potential for expansion

Microdrive: Enables a further six QL Microdrives to be attached. Four blank cartridges are supplied with each QL

ROM Cartridge: Accepts one QL ROM cartridge up to 32K

Joysticks: Provision for one or two for games or cursor control

QL Professional Integrated Software



Word Processing

ACTUAL SCREEN SHOTS

You would have to pay more than the price of the QL if you brought programmes of this calibre separately — we include them with your QL purchase! Integrated features include ability to transport data from one programme to another. Full use of colour, plus HELP screens make these programmes indispensable for home/business users.

Word-processing

QL Quill word-processing gives an exact screen display of how your printed work will appear. Helpful prompts are available on-screen to step you through every word-processing task. Features include automatic word-wrap and paragraph indentation. Delete text by character, word, line or by block. Search and replace. Cut and paste, set tabs, margins, line spacing, headers and footers, view wide document. Combine data from other QL programmes. Boldface, superscript, subscripts, underline, hyphenate, overwrite. And more!

Spreadsheet

QL Abacus makes simultaneous calculations and "what if" model-construction easier than they have ever been. Refer to rows, columns, and cells by names, not just letters and numbers. Function keys can be assigned calculations with a single key-stroke. On screen prompts and Help menus simplify operations. You can link spreadsheets, use multiple windows, vary column width and justification of text. Scroll windows jointly or separately, horizontally or vertically. There are many more features!

Database management

QL Archive is an extremely sophisticated yet easy to use filing system using a language even simpler than BASIC. You can define relationships, extract data and reorganize it, do statistical and accounting calculations and more. Screen editor allows you to design your own screen and format reports. Procedure and programmes may be written and saved for repeated use. Choose from 84 command words for queries, cross-reference entries, and search any number of files. Easy-to-use since everything is performed within the framework of familiar information prompts and Help menus.

Graphics

Spectacular colour graphs are easy to create with single key-stroke commands. QL Easel does not require you to format display before entering data; it handles design and scaling automatically or under your control. There are nine graph styles. Text can be added or altered as simply as data. QL Easel can also manipulate and evaluate data using a series of command math functions and formulas.



4 COLOUR PRINTER PLOTTER

Draws clear Hi-Res Graphics, Charts, and Text in 4 Selectable Colours

**only
\$249⁹⁵
model PL-1**

- * Connects to any computer with Centronics (parallel) interface
- * Can be easily programmed for basic (complete operating manual supplied)
- * Change colours instantly at any time
- * Variable sized text, selectable from 1 to 80 columns!
- * Can print in 4 directions (e.g. upside down, sideways, etc.)
- * Includes 4 Long-Life colour plotting pens and 1 roll of paper (4" width)

Gladstone Electronics is proud to introduce a new standard in printer plotters. The fine resolution will amaze you. It can even print up to 80 columns in a small but easily readable type format. Print size is totally selectable in any number of characters per line, from 1 to 80. Uses standard paper (not thermal). The new PL-1 printer plotter from Gladstone Electronics. ETI loved it. You will too. Order today.



Order
Cosmic
PL-1

**as
featured
in ETI**

Set of 4 extra pens \$9.95

STANDARD PARALLEL INTERFACES. If your computer does not have a Centronics output, this chart indicates what you will need to order. To use any printer on this page

COMPUTER	CENTRONICS INTERFACE MODEL:	PRICE
C-64/V20	Cardco G interface & cable	\$129.95
2068 Timex	CI-2068 interface & cable	\$169.95
ZX81/ TS1000	CI-1000 interface & cable	\$159.00
Apple	or clone for II, II ⁺ , II ^e	
	Pic card & cable	\$124.95
Apple 2c	Model 1 Granny Smith & cable	\$199.95
Macintosh	Model 2 Granny Smith & cable	\$219.95

NEW SMITH-CORONA FASTEXT-80 DOT MATRIX PRINTER

\$399.95

Speed: 80 characters per second.

Friction feed standard
— optional tractor feed.

80 character print line at 10 CPI.

Full line buffer.

Centronics compatible parallel interface. Six pitches.

Graphics capability.

Fanfold or single sheets; (roll-optional).



3 New Smith-Corona Dot-Matrix

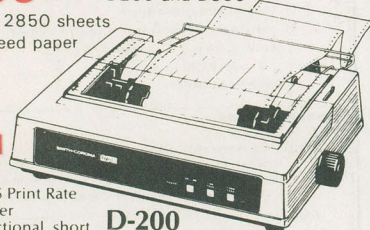
**\$499⁹⁵ TRACTOR AND
FRICTION FEEDS
Model D100 120 CPS**

Gives you excellent data quality printing at 120 characters per second. Includes both friction feed and tractor feed, plus bi-directional printing, short line seek, and vertical and horizontal tabs. It has a full-line buffer, six pitches, graphics capability, and proportional spacing. Centronics® compatible parallel interface is standard. Serial is optional.

BONUS! Includes 2850 sheets tractor feed paper

\$699⁹⁵ Serial and parallel interface on
D200 and D300

includes 2850 sheets
tractor feed paper



QL READY

- 120 CPS Print Rate
- 2K Buffer
- Bi-directional, short line seeking
- Six Pitches, proportional spacing
- Vertical and Horizontal tabs
- Nationwide Service network

D-200

- Graphics at 60, 72, 120 DPI
- Horizontal, 72 DPI Vertical
- Standard Tractor feed
- Built-in Dual Interface, parallel or serial

\$899⁹⁵

D300



BONUS QL READY

Price includes 2850 sheets 14" tractor feed paper. Now 160 CPS.
Same specs as D200 but accepts paper up to 15" wide

14" Colour Monitor \$515⁰⁰

RGB/Composite Video Inputs



\$499⁹⁵ Also works great for VCR!

QL READY

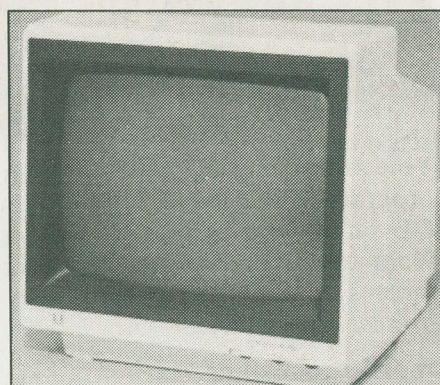
**JCMR 1920 3 or more @ \$499.95
JIL 14" Colour Display Monitor**

- Designed for both computer and television reception
- RGB/NTSC composite and separated video: compatible with virtually all personal computers
- Total 2000 characters (80 x 25 lines, 5 x 7 dots)
- Colour display, Composite Video - all colour RGB: 16 colours
- Individual function control in the front
- Built-in front speaker for audio
- Medium resolution quality
- Video input level: 1.0 - 1.25 Vp-p
- Video bandwidth: RGB: 18 MHz

Dimensions: 356 x 363 x 385 mm (H x W x D)
Gross Weight: 10.91 kg



12" Monochrome Monitor



JIL - Green or Amber \$149.95

- Designed for business or personal computers
- Total 2000 characters (80 x 25 lines) (5 x 7 dot)
- Brightness and contrast control on front
- Green phosphor P31 display
- Composite video input
- Video Bandwidth: 18 MHz
- Video input level: 1.0 Vp - P
- RCA pin jack connector

Dimensions: 350 x 386 x 371 mm (W x H x D)
Gross Weight: 5.91 kg.

JMMR 1902 (same as above)

- Amber display



**MONITOR ONLY 4 for
STAND \$29.95 \$99.95**



Swivel Base for Video Display Monitors & TVs
Let's you turn your monitor or TV to any position you like!
Swivels a full 360° - features 12.5" up/down tilt adjustment.

**Order toll free — have your credit card ready
1-800-268-3640 (to place orders only)
Product Information (416) 787-1448**

The GLADSTONE Library



NO.	TITLE	PRICE
20520	How to Build Speaker Enclosures	8.50
21127	How to Read Schematic Diagrams	10.50
21156	Sound System Engineering	30.95
21218	Reference Data for Radio	48.95
21651	Prog. & Interfacing the 6502	25.50
21656	6502 Software Design	18.95
21682	Z-80 Micro Design Projects	20.95
21696	Microcomputer Dictionary 2nd Ed.	23.95
21741	Circuit Design Programs/TRS-80	20.50
21742	Know Your Oscilloscope 4th Ed.	15.50
21744	You and Your Telephone	11.50
21746	Tube Substitution Handbook	6.95
21805	16-bit Microprocessor	22.50
21831	Real Time Control	20.95
21833	Electronic Music Circuits	23.95
21834	Fiber Optics	22.50
21836	Advanced 6502 Interfacing	18.50
21842	Introduction to Forth	15.50
21846	Enhancing Your Apple II - Vol. 1	25.50
21859	Television Servicing	23.95
21862	Apple Interfacing	16.95
21894	Apple II Assembly Language	22.50
21896	Intro to Elect Speech Synth	12.95
21932	IC Timer Cookbook - 2nd Edition	25.50
21948	VIC 20 Prog Ref Guide	23.95

NEW QL PUBLICATIONS - JUST RELEASED

Introduction to the Sinclair QL	\$19.95
Introduction to SUPER BASIC on the QL	19.95
Advanced Programming for the Sinclair QL	19.95
Word Processing on the QL	19.95
Desk Top Computing with the QL	19.95

21957	T/S 1000/ZX81 Basic Book	18.95
21959	The Apple II Circuit Description	32.50
22010	Commodore 64 User's Guide	18.50
22012	T/S 1000/ZX81 User's Handbook	8.50
22015	CP/M Bible: Authoritative Guide to CP/M	27.95
22022	Semiconductor General Purpose Repl	27.95
22024	8088 Assembler Language Prog	22.50
22027	IBM PC Interfacing	22.50
22030	Soul of CP/M Using and Modifying CP/M's	26.95
22037	Best Book of Lotus 1-2-3	18.50
22039	The PC DOS Companion	22.50
22056	Commodore 64 Prog Guide	27.95
22077	T/S Basic Primer with Graphics	13.95
22091	Commodore Software Encyclopedia	27.95
22175	Apple Programmer's Handbook	32.50
22188	VIC-20: 50 Easy to Run Computer Games	8.50
22189	VIC-20 Games, Graphics, and Applications	12.95
22254	The Local Area Network Book	11.50
22279	C-64 Basic Programming in 14 Days	18.50
22296	Radio-TV Station Guide	13.95
22307	Best Book of Lotus 1-2-3	18.50
22361	Introducing the Apple Macintosh	18.50
22393	Introducing the Apple II C	18.50

Profiting from the QL: QL Abacus	\$24.95
Using Graphics on the QL: QL Easel	24.95
Database Management on the QL: QL Archive	24.95
Makeing the most of the QL: QL SUPER Basic and it's Applications	24.95
Machine Code Programming of the QL	24.95

NEW TITLES - NEVER BEFORE LISTED

NO.	TITLE	PRICE
22057	Intro to Robots for Industry	26.95
22166	Advanced Robot Systems	22.95
22191	Graphics for the IBM PC	20.95
22328	Macintosh User's Guide	23.95
22353	Apple II/IE Troubleshooting/Repair	26.95
22396	Commodore 64 Trivia Data Base	12.95

COMPUTERFACTS (SERVICE/TECHNICAL GUIDES)

008900	(CC-1) Apple II, II+ Computer	25.50
008901	(CC-2) TI-99/4A Computer	25.50
008902	(CD-1) Rana Elite 111 Disk Drive	25.50
008903	(CC-3) Commodore VIC-20 Comp.	25.50
008904	(CP-1) Epson MX80	25.50
008905	(CPT-1) Panasonic CT 1310M Hitachi CM1481	25.50
008906	(CC-4) Commodore 64 Computer	25.50
008907	(CD-2) Rana Elite 11	25.50
008908	(CP-2) Epson MX100	25.50
008909	(CSCS-1) Osborne OCC1, OCC1A Computer	55.95
008910	(CMT-2) Zenith ZVM-121 Panasonic CT 1350MG	25.50
008911	(CC-5) Atari 400 Computer	25.50
008912	(CMT-3) AMDEK Video-300 AMDEK Color 1	25.50
008913	(CP-3) IBM 5152-002 - Printer	25.50
008914	(CSCS-2) IBM PC 5150 Computer w/Dual Disk Drive	55.95
008916	(CMT-4) IBM Color Monitor 5153 Apple Monitor (Mono)	25.50

HARD TO FIND ... UTILITY SOFTWARE

(Apple II & IIe Continued)

TITLE	PRICE
ARTSCI	
Forth II	89.95
Listener	32.95
Screen Machine	39.95
Talker	32.95
BEAGLE BROTHERS	
Alpha Plot: Hi-Res Graphics Utility	52.95
Apple Mechanic: Shape Editor/Byte Zap	38.95
Apple Mechanic Type Faces: 26 Fonts	26.95
Beagle Basic: Applesoft Enhancer	45.95
Beagle Graphics: 128K Hi-Res	78.95
D Code: A'Soft De-Bugger	52.95
Diskquik: Apple IIe Disk Emulator	38.95
DOS Boss: Disk Command Editor	32.95
Double-Take: 2-way Schroll/List & Xref	45.95
Fatcat: Disk Library Disk	45.95
Flex Type: Hi-Res Text Utility	38.95
Frame Up: Apple Presentation Utility	38.95
GPLe: Global Program Line Editor	65.95
Pronto DOS: High Speed DOS & Mover	38.95
Tip Disk #1: 100 Tip Book Programs	26.95
Tip Disk #2: Silicon Salad	32.95
Triple Dump: Print Anything Utility	52.95
Utility City: 21 Utilities + Xlister	38.95
BRODERBUND	
Dazzle Draw 128K	78.95
Print Shop	65.95
Print Shop Graphics #1	32.95
CODEWRITER CORP.	
Menuwriter	72.95
DATASOFT	
Micropainter	39.95

HAYDEN SOFTWARE	
ORCA/M	117.95
HAYES	
Smartcom I (Apple II, IIe	154.95
Terminal Pkg. (Apple & Smartmodems)	129.95
MICROLAB	
Lifesaver (Disk Utility)	34.95
Painter Power	54.95
MUSE	
Data Plot	77.95
U-Draw II	51.95
The Voice	51.95
PENGUIN SOFTWARE	
Cat Graphics 1-2/Res	44.95
Complete Graphics System	104.95
Complete Graphics - Additional Type Sets	25.95
Complete Graphics - Map Pack	25.95
Disk Arranger	38.95
Disk Repair Kit	38.95
Graphics Magician 1-2/Res	77.95
Graphics Magician Picture Painter 128K	77.95
UNITED SOFTWARE	
ASCII Express	169.95
ASCII Express 128K	169.95

APPLE MACINTOSH

HABA SYSTEMS	
Habacom	129.95
Window Dialer	64.95
COMMODORE 64 DISK	
BRODERBUND	
Bank Street Writer	65.95
CONTINENTAL	
F.C.M. (Filing, Cataloging & Mailing)	64.95
Home Accountant	97.95
Home Cataloger	64.95

Note: All Apple programs listed also run on II C

COMMODORE 64 CARTRIDGE

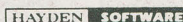
HESWARE	
HES KIT 64	57.95
HES MON 64	57.95

COMMODORE 64 DISK

BRODERBUND	
Print Shop	58.95
Print Shop Graphics #1	32.95
CODEWRITER CORP.	
Menuwriter	62.95
Dialog	72.95
Elf System	72.95
Speedwriter	82.95
DATAMOST	
Paint Magic	51.95
Kwik-Load	25.95
HESWARE	
Graphics Basic	38.95
PENGUIN SOFTWARE	
G M Picture Painter (Incl. Atari Disk)	51.95

IBM PC DISK

CODEWRITER CORP.	
Menuwriter (PC Only)	72.95
HAYES	
Smartcom II (IBM PC)	194.95
SOFTWARE PUBLISHING	
PFS: Access...IBM	124.95
UNITED SOFTWARE	
ASCII PRO-MS DOS	247.95



GLADSTONE-ELECTRONICS

SERVING CANADA FOR 20 YEARS

Gladstone Electronics, 1736 Avenue Road, Toronto, Ontario M5M 3Y7 Toll Free Order Line 1-800-268-3640

COMPACT CB RADIO FOR TODAY'S CARS!

MAXCOM 20

only \$88.⁰⁰



SPECIFICATIONS

Unit Size: 1 3/4" (44mm) H x 6 5/16" (160mm) D x 4 3/4" (119mm) W

Accessories Included: 500 ohm push to talk microphone with coil cord and din connector. Microphone clip. Fused 3-pin DC power cord. Mounting bracket and hardware. Owners manual. Required FCC forms.

Frequency Control: Phase Locked Loop

Receiver Sensitivity: 0.7 uV for 10 db(S+N)/N

Receiver Selectivity: more than 55 db/10 KHz

Controls: On/off/volume. Variable Squelch. ANL off. CB/PA Switch. Channel selector with readout. Analog signal/RF power meter and transmit indicator.

- Super small, light weight unit allows flexible mounting in newer compacts and imports
- Wide variety of features include back-lighted analog signal/power meter preferred by many frequent users
- Automatic Noise Limiter (ANL) switches "on" to reduce atmospheric noise if present
- Large scale LED channel indicator and accurate Phase Locked Loop (PLL) tuner
- Public address amplifier is built-in—accepts 3.5mm optional PA speaker
- Clean, modern cosmetics blend with all auto interiors

Never before has a CB radio been available like Maxcom® 20 in a mini-size, with so many features, and at such a competitive price. The rugged cabinet incorporates all solid state circuit components resulting in extremely sensitive receiver, high level modulation, and full 4 watt output capability.

Variable squelch and switchable ANL circuits function to quiet receiver in standby mode and reduce atmospheric noise when present in receiver. For feature and performance, Maxcom® is the name to remember for communications products.



C.B. ANTENNA \$29.95

Rugged mobile C.B. antenna, base loaded, stainless steel for years of protection. Heavy duty no-hole trunk lip mount, lead-in coax wire, and connector to C.B. are included. Coil, spring, and whip are easily detachable for storage.

FM Wireless Communications

Communicate with Gladstone's.

Model 49S

only \$64.⁹⁵
EACH

3 or more at
\$59.95 ea.



Operates on its own private
licensed channel

- Voice-actuated switching from transmit to receive
- Up to 1/2 mile range
- Light-weight portable — go anywhere
- Great for cycling, construction sites, film crews, factories, or anywhere you need to communicate!!

Model 49B — Same as 49S but includes protective carrying case and charger for ni-cad batteries. \$84.95 each. Three or more at \$79.95 each. Formerly sold at \$119.95 each.

Note: Two or more units are required for communications.

FEATURES

TRANSMIT MESSAGES AUTOMATICALLY . . . Just speak into mic element on headset — Vox circuit activates by adjustable Hi-Med-Low mic sensitivity switch. Eliminates false triggering caused by ambient noise in background.

VOX BYPASS . . . Switches unit to manual (PTT) mode; user presses PUSH-TO-TALK switch before transmitting.

ADJUSTABLE HEADSET: Comfort-fitting earpiece with foam cushion pad contains communications quality speaker element. Audio volume controlled by Hi-Med-Low switch for listening preference. Efficient Condenser mic element with protective wind screen on moveable boom. Whip antenna secures out of way when not in use.

EXCELLENT PERFORMANCE: FM transmitting range can effectively reach 1/4 to 1/2 mile (with unobstructed line of sight and fresh battery); clean, noise-free reception thru crystal controlled dual conversion superheterodyne receiver.

VARIETY OF USES: SPORTS AND RECREATION — coaching, skating, racing, hiking, boating, fishing, camping; **BUSINESS** — warehousing, construction, loading and unloading, surveying, hospital use — hundreds of applications.

PORTABLE, CONVENIENCE — Rugged, yet light-weight cabinet has spring loaded clip on rear case for securing to belt or pocket. Measures just 4 9/16" (H) x 2 1/2" (W) x 1 5/16" (D). Weighs less than 9 oz. (270g).



Portable-Mobile 40 Channel CB Transceiver

only \$109.⁹⁵

formerly sold
for \$124.95

2 or more
@ \$99.95 each

- * Includes
Eveready
batteries



- * Full 5 watts * Mobile or portable

Maxon's Model Maxcom-7 CB transceiver takes the practical uses of CB communications and combines them with portability to make the most versatile system on the market. Maxcom-7 operates as a regular mobile CB or, with minor modifications, can quickly be changed to a portable. It's easy to use and comes complete with accessories (batteries optional). Maxcom-7 . . . A good idea made even better, by Maxon.

FULLY COMPATIBLE . . . Maxcom-7 operates on all 40 CB channels. Channel 9 is highlighted for quick visual reference.

COMPLETE CONTROLS . . . Power "on" / volume control lets user adjust audio output for comfortable listening. Rotary squelch silences receiver when no incoming signals are present. Large channel knob is easy to grip for changing stations.

EASY OPERATION . . . User just presses big Push-To-Talk bar and speaks into built-in mic. Transmit (TX) L.E.D. gives visual reinforcement that message is "Getting Out". Release Push-To-Talk bar to receive message.

CAR ANTENNA . . . Magnet mount base holds screw-in telescopic antenna . . . magnet holds base to metal surface on car such as roof or trunk lid. Lead wire from magnet base terminates in RCA plug which inserts into jack on bottom of radio.

PORTABLE ANTENNA . . . Telescopic antenna with threaded base removes from magnet mount . . . connects directly to threaded jack on top of radio.

TWO POWER CHOICES . . . Fused cigarette lighter adaptor with coaxial plug can supply power direct to unit from car electric system. The portable carry case is designed to accept 10 (Ten) 1.25 volt rechargeable nicad batteries. A "charge" jack is provided in the battery compartment for recharging nicad batteries. (Optional charger required. Regular 1.5 volt carbon-zinc batteries can be used to power the unit but these batteries **cannot** be recharged.)

STORAGE CASE . . . Protective vinyl clad case holds unit and all accessories . . . has carry handle and snap-lock cover. Stores under seat or in trunk.

Model 49-HI
same as
49-HR
but less
FM Radio
\$99.95

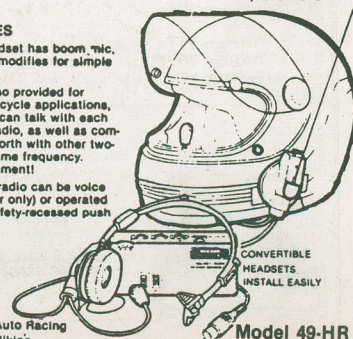
**Helmet Adaptable FM
Two-way Radio With FM
Broadcast Receiver and Rider
to Passenger Intercom**

SPECIAL FEATURES

- New convertible headset has boom mic, earpiece that easily modifies for simple helmet installation.
- Intercom headset also provided for helmet use. In motorcycle applications, rider and passenger can talk with each other, listen to FM radio, as well as communicate back and forth with other two-way radios on the same frequency. Safety plus entertainment!
- Hands-free two-way radio can be voice operated (by the rider only) or operated manually by large safety-recessed push to talk button.

HUNDREDS OF APPLICATIONS!

- Motorcycles
- Snowmobiles
- Bicycles
- Hang Gliders
- Boating
- Ultralight Aircraft
- Auto Racing
- Hiking
- Industrial
- Hot Air Ballooning



Model 49-HR
\$129.95

Moorshead Publications Software Services

Stockboy Inventory Control Package

When we first advertised this program, we would have been pleased with a fraction of the orders we received. On reflection we should have appreciated what a bargain it is. Inventory programs are generally pretty expensive and some of them are inflexible and some even badly engineered. You may find that even small inventories generate enormous files.

Stockboy is a good, powerful, flexible bargain-priced package which will handle inventory for small businesses. We use Stockboy within Moorshead Publications for our own inventory control and it has stood the test of time.

Stockboy can:

- Maintain an inventory database with current, maximum and minimum stock reporting when an item needs re-ordering.
- Be a point of sale terminal, adjusting the stock data base on line.
- Produce individual packing lists.
- Generate a customer list to be used in mass mailings.
- Run on any CP/M or MS-DOS based computer, even an Apple II running with a softcard.

Stockboy is written in Microsoft BASIC, and is designed to be easily altered to suit your needs. It can be compiled using BASCOM if you desire. It is designed for use by non-technical operators.

Available for: CP/M and PC formats

\$29.95 most systems **\$34.95** for 8"

Ontario residents add 7% PST.

MDM730

MDM730 is one of the most powerful MODEM7 programs available... and the Computing Now! version of MDM730 incorporates features not available in the public domain editions. If you are into telecommunications, bulletin boards and downloading software your life will be full and meaningful with this code. For background on MDM730, see July 1984 Computing Now!. Consider the facilities.

- Terminal program which works at any baud rate.
- Ten programmable macro function keys.
- Thirty six number phone library.
- Christensen software transfer protocol.
- User settable toggles for line feeds, ON-XOFF and so on.
- Extensive help menus.
- Baud rate selection on the fly (or the spider).
- ASCII dump and capture.
- Status menu
- Many more features.

In addition to all this splendor, however, we've added dialing support for the Apple version. While the standard MDM730 cannot dial unless it's hooked to a Hayes Smartmodem, we've added patches to it to allow it to do pin twenty five pulse dialling and to dial through the Hayes Micromodem II and the SSM card. The Computing Now! MDM730 will also

- Select a number from the library and dial it
- Accept a hand entered number and dial it
- Wait for carrier
- Log you onto the remote system if it's free
- Optionally autodial if the remote board is busy.
- Count the number of attempts at dialling the remote BBS.

The Computing Now! MDM730 package is available for

- The Hayes Micromodem II.
- The SSM 300 Baud modem card.
- The PDA 232C serial card with external modem.

The PDA 232C package includes versions supporting both the Smartmodem and a dumb modem with pin twenty five line control, such as the Novation AutoCat. Also included with each package are utilities to permit easy alteration of the phone number library and the function key macro strings plus an extensive documentation file.

The source code file for this program is over a hundred and fifty kilobytes long. It cannot be hacked on a standard Apple. We patched it on a larger machine and downloaded it. As such, we're pretty sure that MDM730 with these features is unavailable elsewhere.

Available for: Apple II +
CP/M 2.2. systems

TRS-80 Model II (complete with
the above applicable features)

Please specify modem version
from above list.

\$29.95

Ontario residents add 7% PST.

Fine Print:

The original MDM730 code is in the public domain. We are offering this part of the program without cost. The charges for this package are for the patches created by Computing Now! and to defer the cost of handling and postage.

This software is guaranteed to work correctly if properly applied. The serial cards on Apple and compatible systems must be installed in slot two with at least 48K of RAM running Microsoft CP/M 2.2. The PDA 232C version will require the availability of either a Hayes Smart-Modem or a modem with pin twenty five line control to dial. Users of the SSM card version may experience some difficulty in detecting extremely faint carriers on older versions of this card.

Formats

Where CP/M is shown, the following formats are available:

Apple II + CP/M (see below)

Access Matrix, Morrow Micro Decision, Superbrain, Xerox/Cromenco*, Epson QX-10VD, Sanyo MBC1000, Nelma Persona, Kaypro II, Osborne Single Density*, Osborne Double Density, Teletype, DEC VT-180, Casio FP-100, Zorba, 8 inch SSSD*

*Software marked with an asterisk is the higher price quoted.

MDM730 for the Apple II + CP/M requires two disks and is at the higher price.

PC

Available for the IBM PC and genuine compatibles.

AppleDOS

For Apple II + and genuine compatible systems.

TRS-80 Model II CP/M

Will operate under either Lifeboat or Pickles and Trout CP/M.

Apple Wordstar Fixer

Apples and Wordstar are not entirely friendly. Apple compatible systems equipped with Videx type eighty-column cards do a number of unpleasant things to this popular word processor. While there are simple cures for this... they all involve some delicate code hacking.

The Fixer solves this problem. Place it on the same disk as your copy of WS.COM, type FIXER and after a suitable amount of disk noise version 3.0, you will have APWS.COM on there too. This version of Wordstar includes special patching and unhooking code which runs each time you boot Wordstar, and makes your fruit behave as it should. It releases the control K's, translates the left arrow key to a delete character, and patches Unitron keyboards.

In addition all of this, the fixer allows you to set some of the defaults of Wordstar which the MicroPro INSTALL Package doesn't really get to. All of these features are menu driven in English for absolute non-technical operation.

Fixed Wordstar will run in either 44K or 56K CP/M.

Available for:

Apple II + CP/M only.

\$19.95

Ontario Residents add 7% P.S.T.

Steve's CP/M Wunderdisk! Volume the First

In the course of doing the last year or so of Computing Now! we've generated a lot of code. We've collected all the programs we've written... some of which have never been published in any of our magazines... and put 'em all on one disk. Included are things like STAR, the Gemini 10 printer setup, the Last Wordstar Unhook, CPMAP and the CP/M HOST program, complete with several unreleased support programs.

The Wunderdisk is the best collection of tricky CP/M routines on the planet, ideal for anyone who wants to get inside this powerful operating system and sing. It's also the best documented... the programs, for the most part, are written up in issues of Computing Now!

The Wunderdisk is available for: CP/M

\$19.95

Ontario Residents add 7% PST.

Gemini WordStar PRESS

The WordStar printing function is agonizingly slow. It's also not very obliging in regards to where it puts its page numbers and things like headers.

PRESS is a utility which handles the formatted printing of all sorts of text files, be they manuscripts, drafts, program listings... anything that you'd normally want printed out in page form. It installs the header of your choice at the top of each page and slaps the page number beside it.

It also gives you a running count of the number of characters, lines and pages having hit the printer as you go. It allows you to have your documents printed out in a variety of type size and style permutations, commensurate with the capabilities of your printer.

Most important, however, PRESS will send text to your printer, formatted and all, as fast as your printer can accept it. It will even adjust the high bits of WordStar files to avoid selecting the Sanskrit character set.

PRESS comes configured for the Gemini 10X and 15X printers. It will, in fact, be quite happy with most Epson compatible dot matrix printers. A version is also supplied for use with letter quality daisy wheel printers.

PRESS is a simple to use package which communicates with you in plain English.

Available for: CP/M

\$19.95

Ontario Residents add 7% PST.

Order direct from

**Software Services,
Moorshead Publications
25 Overlea Boulevard, Suite 601
Toronto, Ont. M4H 1B1
Phone Orders and Major Credit Cards Accepted**

Software Now!

The difference between we humans and the other inhabitants of the planet, is our capacity for making tools. Civilization is often measured by its grasp of technology... it's through his use of tools that man has come to be able to manipulate his environment.

The computer is the ultimate tool... it is, like man himself, unspecific, and thus adaptable to virtually any task. The same computer can be a bookkeeper, a game, an artist's palette, a composer's amanuensis, a word processor or a programmer's development station.

The computer itself is simply a box full of chips. The power of computers lie in the software that runs on them.

Software Now! is the magazine for people harnessing the power of the microcomputer. In its pages, you will find the information which you will need to choose and apply the software that will dedicate your computer to your tasks. It will help you make sense of the myriad of similar software packages, translate the intricate complexities of software claims, understand the watershed breakthroughs in software development... and even have a bit of time left over to dematerialize a few aliens.

Perhaps most exciting, however, is that the pages of **Software Now!** contains news about software for applications you've never even considered running on your computer. Imagine having an overview of the work of the world's most gifted program developers... and you'll have a good idea as to what **Software Now!** is about.

Software Now! deals with a broad range of systems and applications, encompassing eight, sixteen and thirty-two bit machines, and software as diverse as video games, drafting systems and spreadsheets.

Features In The Queue

Here's some of the editorial line up for the next few issues of **Software Now!** You can expect it to change a bit... new software springs up almost daily, and **Software Now!** is always featuring the most important developments in this dynamic field.

Computer Aided Drafting On a Micro • Techniques in MacPaint • How to choose a Spreadsheet • Apple Software Crate • Getting to the Root of UNIX • The Digital Research Pantry • A Thousand and One Word Processors • IBM's Productivity Family • Can Mac Write? • Professional Software Roundup • Power Programs for the 64 • Approaching the C • Word Processing Support Programs • dBASE II Enhancements • Will it Run Multiuser? • Concurrent CP/M

Reviews (typically 10 each issue): 10 Base • Mighty Mail • WORD-BASE • Easy Script • Computer Chef • Electronic Circuit Analysis Program • Superex Retailer • MAI Basic Four • The Print Shop • TK!Solver • Microsoft BASIC for the Macintosh • Sundog • Turbo PASCAL for the IBM • AutoCAD • MultiMate • Lexicheck and Word Juggler • Dataflex • Symphony • Omniterm 2 • DB Master • Paint Magic

In addition to this, look for these regular features:

The Library	(Monthly survey of books)
By The Board	(Public domain software)
Arcade	(A look at the latest games)
Short File	(An overview of new releases)



We've reached a level of development in microcomputer software wherein one needn't be a computer genius to apply a computer. In fact, one can operate a computer with only a bit more expertise than one needs to successfully make toast. The key that will unlock the power of your computer is the software you plug into it.

The key to that software is understanding.
The key to understanding software is Software Now!

SAVE UP TO 51%

To: **Software Now! Subscriptions, Moorshead Publications,**
 25 Overlea Blvd., Suite 601,
 Toronto, Ontario, M4H 1B1 (416) 423-3262

YES, I want to subscribe to Software Now! **I understand that I may cancel my subscription at any time and receive a refund on the unexpired portion.**

☐ Please send me a full year of Software Now!(12 issues) at the special rate of \$19.95, a **41%** saving off the newsstand rate.

☐ I would prefer **two years** (24 issues) at \$34.95, a saving of **51%** from the newsstand rate.

For US add \$3.00 per year, other countries add \$5.00 per year.

☐ Cheque/Money Order enclosed. ☐ Visa ☐ MasterCard ☐ Am. Exp.

Card No _____ Expiry Date _____

Name _____

Address _____

City _____

Province _____ Post Code _____

**Computing Now! is
Canada's fastest
growing magazine (1983-84)
Independent Evaluation**

Computing! Now!

You can't go outside any more without being inundated with advertisements for computers. In fact, even staying inside won't help very much, unless you unplug the TV and the radio and threaten the postman with violence so he'll stay away. Computers are becoming as much a part of our culture as are TV, cars and central heating. In five years, computer illiteracy may be as much of a handicap as print illiteracy was five years ago.

Despite the colourful advertisements that have turned up in the media for computer hardware, micros are still understandably forbidding for many people. In fact, though, most new computer owners are amazed at just how small the leap from unpacking the thing, to getting it to do what they want it to do really is.

A computer is an everything tool. It can do anything you can conceive of having it do, limited only by your own ingenuity in telling it how. This is the art of programming, an experience not unlike that of an artist with every colour of paint imaginable and a blank canvas the size of Australia. However, the canvas of a computer never gets full ... the more you learn how to do, the more you'll realize it is possible to tackle.

Computing Now! magazine can be the most useful accessory you can buy for your system. Every issue is stuffed full of news about products which will enhance your system, programs to run on it, ideas and applications to give you new things to do with your machine, articles about programming techniques, and tricks to make your computer a better tool for realizing your ideas, and piles of other features to help you get the most out of your system.

Whether you are looking at a computer as a hobby or to run your business, **Computing Now!** can provide you with information and applications to make your system the most useful thing you've ever bought next to the can opener. The articles in **CN!** are written by people who are using computers daily, and are among the most experienced small computer users in the country.

Computing Now! is published and wholly owned in Canada. As such, the articles and advertisements in it relate specifically to products you can get North of the border. There is nothing more frustrating than finding something interesting in an American magazine, only to discover that it will take four months to drag it through customs.

We know microcomputers and we practise what we preach — in fact, we are probably one of the most computerized companies in Canada. Here are just some of the systems we currently own: Apple II and compatibles (15 systems); Apple Macintosh; IBM PC and compatibles (BEST; Corona, Columbia, JLS); Nelma Persona (2); TRS-80 Model II (2); Commodore 64; Vic-20; Commodore PET; ZX81; if800; Acorn Atom; Multiflex. These are just some of the systems we own and use ourselves; our contributing editor's systems are additional to this list.

With powerful computers becoming widely available, you can't afford not to be aware of the expanding universe of micros **Computing Now!** can provide you with an understandable, incisive and varied insight into this powerful new technology. It is written to be

both understandable by the beginner and informative for the more experienced user with a depth and variety unequalled by any other contemporary computer publication.

Recent articles: Local Area Networks • Hexes and How to Throw Them • Interrupts on the IBM • Review of Three IBM Clones • Bandit (a game) • What is MS-DOS? • Rescuing Lost Data on the 64 • Backing Up Protected Disks • Stockboy (an inventory control program) • Computer Aided Drawing • Survey of Portables • Infomart • Digging up CP/M • Drum Card Review for the Apple • Review of the HP 150 • Hacking Modem7 • How to Use the Smartmodem • CP/M MAC Macro Assembler • Popular Business Software Directory • Explaining the IBM Serial Interface • Directory of Microcomputer Paraphernalia • Xerox Service Centres • CN!'s Most Asked Questions • dBASE II Report Generator • Dimension 68000 Review • Review of Radio Shack's 2000 • IBM Telecommunications • Business On Line • A Potful of BASIC Routines •

SAVE UP TO 51%

To: **Computing Now! Subscriptions, Moorshead Publications,**
25 Overlea Blvd., Suite 601,
Toronto, Ontario, M4H 1B1 (416) 423-3262

YES, I want to subscribe to **Computing Now!** I understand that I may cancel my subscription at any time and receive a refund on the unexpired portion.

☐ Please send me a full year of **Computing Now!** (12 issues) at the special rate of \$22.95, a 41% saving off the newsstand rate.
☐ I would prefer **two years** (24 issues) at \$37.95, a saving of 51% from the newsstand rate.

☐ Cheque/Money Order enclosed. ☐ Visa ☐ MasterCard ☐ Am. Exp.

Card No _____ Expiry Date _____

Name _____

Address _____

City _____

Province _____ Post Code _____

Moorshead Publications

Almost Free Software

Almost Free Software #1

Almost Free Software #2

Almost Free Software #3

Almost Free PC Software #1

Almost Free Software #1, #2 and #3 are for CP/M and are available in a variety of formats: Apple II + CP/M, 8 inch SSSD*, Access Matrix, Morrow Micro Decision, Superbrain, Xerox/Cromemco*, Epson QX-10VD, Sanyo MBC 1000, Nelma Persona, Kaypro II, Osborne Single* and double densities, Televideo, DEC VT-180, Casio FP-1000, Zorba.

*single density formats require two disks. The package cost for these formats is \$19.95

For IBM PC's and genuine compatibles. Available in Double-Sided or two Single-Sided Disks.*

Modem7. Allows you to communicate with any CP/M based system and download files. Complete details were in Computing Now! November 1983.

PACMAN. You can actually play PACMAN without graphics, and it works pretty fast.

FORTH. A complete up-to-date version of FIG FORTH, complete with its own internal DOS.

DUU. The ultimate disk utility allowing you to recover accidentally erased disk files, fix garbled files, rebuild and modify your system. A real gem.

D. A sorted directory program that tells you how big your files are and how much space is left on the disk.

USQ/SQ. Lets you compress and uncompress files. You can pack about 40% more stuff on a disk with this system.

Finance. A fairly sophisticated financial package written in easily understandable, modifiable Microsoft BASIC.

BADLIM. Ever had to throw out a disk with a single bad sector? This isolates bad sectors into an invisible file, making the rest of the disk useable.

DISK. Allows you to move whole masses of files from disk to disk without having to do every one by hand, you can also view and erase files with little typing.

QUEST. A "Dungeons and Dragons" type game.

STOCKS. This is a complete stock management program in BASIC.

SEE. Also known as TYPE17, will TYPE any file, squeezed or not allowing you to keep documents in compressed form while still being able to read them.

BISHOW. Th ultimate file typer, BISHOW version 3.1 will type squeezed or unsqueezed files and allow you to type files which are in libraries (see LU, below). However, it also pages in both directions, so if you miss something, you can back up and see it again.

LU. Every CP/M file takes up unnecessary overhead. If you want to store lots of data in a small space, you'll want LU, the library utility. It permits any number of individual files to be stored in one big file and cracked apart again.

RACQUEL. Everyone should have one printer picture in their disk collection.

MORTGAGE. This is a very fancy mortgage amortization program which will produce a variety of amortization tables.

NSBASIC. Large disk BASIC packages, such as MBASIC, are great... and very expensive. This one, however, is free... and every bit as powerful as many commercial programs. It's compatible with North Star BASIC, so you'll have no problem finding a manual for it.

Z80ASM. This is a complete assembler package which uses true Zilog Z80 mnemonics. It has a rich vocabulary of pseudo-ops and will allow you to use the full power of your Z80 based machine... much of which can't be handled by ASM or MAC.

VFILE Easily the ultimate disk utility, VFILE shows you a full screen presentation of what's on your disk and allows you to mass move and delete files using a two-dimensional cursor. It has heaps of features, a built-in help file and works extremely fast.

ROMAN. This is a silly little program which figures out Roman numerals for you. However, silly programs are so much fun...

CATCHUM. If you like the fast pace and incredible realism of Pacman, you'll go quietly insane over Catchum... which plays basically the same game using ASCII characters. Watch little "C's" gobble periods while you try to avoid the deadly "A's"... It's a scream.

OIL. This is an interesting simulation of the workings of the oil industry. It can be approached as either a game or a fairly sophisticated model.

CHESS. This program really does play a mean game of chess. It has an on-screen display of the board, a choice of colours and selectable levels of look ahead.

DEBUG. The DDT debugger is good but this offers heaps of facilities that DDT can't and does symbolic debugging... it's almost like being able to step, trace and disassemble through your source listing.

DU87. The older DUU program does have some limitations. This version overcomes them all and adds some valuable capacities. It will adapt itself to any system. You can search, map and dump disk sectors or files. It's invaluable in recovering damaged files, too.

ELIZA. This classic program is a micro computer head shrinker... It runs under MBASIC, and, with very little imagination, you will be able to believe that you are conversing with a real psychiatrist.

LADDER. This is... this program is weird. It's Donkey Kong in ASCII. It's fast, bizarre and good for hours of eye strain.

QUICKKEY. Programmable function keys allow you to hit one key to issue a multi-character command. This tiny utility allows you to define as many functions as you want using infrequently used control codes and to change them at any time... even from within another program.

RESOURCE. While a debugger will allow you to disassemble small bits of code easily enough, only a true text based disassembler can take a COM file and make source out of it again. This is one of the best ones available.

PCWRITE. While not quite Wordstar for nothing, this package comes extremely close to equalling the power of commercial word processors costing five or six bills. It has full screen editing, cursor movement with the cursor mover keypad, help screens and all the features of the expensive trolls.

SOLFE. This is a small BASIC program that plays baroque music. It's also a fabulous tutorial on how to use BASICA's sound statements.

PC-TALK. A Telecommunications package for the IBM PC which does file transfers in both ASCII dump and MODEM7/X-MODEM protocols and comes with... get this... 119424 bytes of documentation.

SD. This sorted directory program produces displays which are a lot more readable than those spewed out by typing DIR.

FORTH. This is a small FORTH in Microsoft BASIC. You can build on the primitives integral with the language.

LIFE. An implementation of the classic ecology game written in 8088 assembler.

MAGDALEN This is another BASIC music program.

CASHACC. This is a fairly sophisticated cash acquisition and limited accounting package written in BASIC. It isn't exactly BPI, but it's a lot less expensive.

DATAFILE. This is a simple data base manager written in... yes, trusty Microsoft BASIC.

UNWS. Wordstar has this unusual propensity for setting the high order bits on some of the characters in the files it creates. Here's a utility to strip the bits and "unWordstar" the text. The assembler source for this one is provided.

HOST2. This is a package including the BASIC source and a DOC file to allow users with Smart-Modems to access their PC's remotely. It's a hacker's delight.

Order as AFS #1
and specify system

Order as AFS #2
and specify system

Order as AFS #3
and specify system

Order as AFPCS #1
Specify Double-Sided or
2x Single-Sided.*

All of this software has been obtained from public access sources and is believed to be in the public domain. The prices of the disks defer the cost of reproducing them and mailing them, plus the cost of the medium. The software itself is offered without charge. A few items include messages imbedded in the code asking for voluntary donations on behalf of the authors.

Moorshead Publications warrants that the software is readable and if there are defects in the medium, we will replace it free of charge. While considerable effort has been made to ensure that programs are thoroughly debugged, we are unable to assist in adapting them for your own applications.

\$16.95 each

Except for 8" disks and those with two disks which are marked with an asterisk (*) above which are:

\$19.95

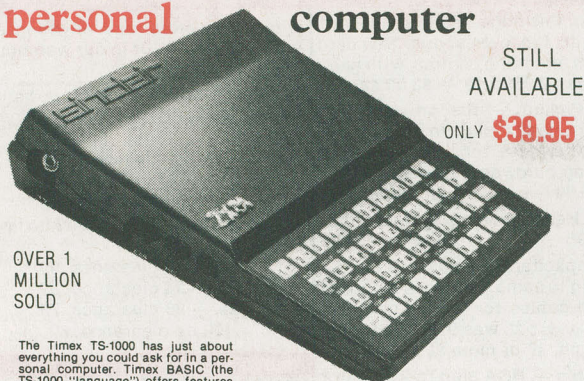
Ontario Residents add 7% P.S.T.

Order direct from
Software Services
Moorshead Publications
25 Overlea Boulevard,
Suite 601,
Toronto, Ontario M4H 1B1

Phone Orders and Major Credit Cards Accepted

Get Serious with your Sinclair

Timex TS-1000 2K Memory expands to 64K personal computer



OVER 1
MILLION
SOLD

The Timex TS-1000 has just about everything you could ask for in a personal computer. Timex BASIC (the TS-1000 "language") offers features usually found only on computers costing two or three times as much. It is an ideal computer for learning programming. It is also excellent for your children's education, and for household and business management. The TS-1000 hooks up to a standard black and white television; programs are stored on an ordinary cassette recorder.

- Unique 'one-touch' key word entry; the 1000 eliminates a great deal of tiresome typing. Key words (PRINT, LIST, RUN, etc.) have their own single-key entry.
- Unique syntax-check and error codes identify programming errors immediately.
- Full range of mathematical and scientific functions accurate to eight decimal places.

COMPLETE WITH ALL ACCESSORIES

- Graph-drawing and animated display facilities.
- Multi-dimensional string and numeric arrays.
- Up to 26 FOR/NEXT loops.
- Randomize function.
- Programmable in machine code.
- Cassette LOAD and SAVE with named programs.
- 2K-byte RAM (expandable).
- Full editing facilities.

STILL
AVAILABLE

ONLY **\$39.95**

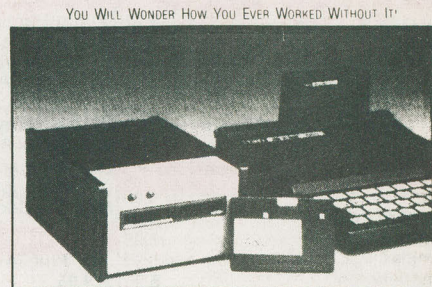
NEW

70K Floppy for ZX81/TS1000/TS1500

Model 82002
Micro Drive

\$319.95
3 or more at
\$299.95 each

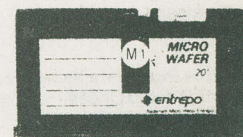
- Data transfer rate 10.4K baud
- 30 times faster than cassette
- Typical access time for 16K — 8 seconds
- Automatic Verify with SAVE
- Plugs into expansion port
 - * Up to 127 files
- Works for BASIC or ML
- Compatible with all other plug-in peripherals
- Program chaining capabilities



PICTURED IS TS1000. STRINGLY FLOPPY DRIVE & INTERFACE FOR RAM AND A MICRO WAFER

SPECIAL MICRO WAFER MYLAR
BACKED TAPE FOR LONG LIFE AND
HIGH RELIABILITY

Model	M-1
1-9	10-24
\$12.95	\$10.95
	\$8.95



MICRO WAFER TAPE

NEW

2068 MICRO DRIVE \$319.95 *CAN STORE 85K*

At last! Similar in design and appearance to the ZX Micro drive Model 2000 listed above, we now offer lowcost high speed mass storage for 2068 users. The high speed 11K baud transfer rate loads a 28K program in 24 seconds. Simple to use — just plugs into expansion port. Comes with 5 wafers, full instructions, and 90 day warranty. Extra wafers, order model M2000 — same price schedule as M-1 listed above. Price of \$319.95 includes interface for 2 drives, and includes 1 drive. For 2nd drive, order Model 2000-1 drive only, at \$249.95.

16K RAM

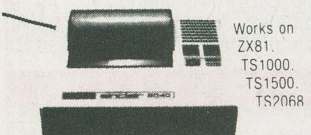
\$49.95

We will supply
Memotech or Timex
RAM depending on
availability



64K Gladstone RAM **\$99.95**

2040 Printer \$99.95



Works on
ZX81,
TS1000,
TS1500,
TS2068

Now you can have hardcopy printouts of your computer calculations, and graphics! 32-column dot-matrix thermal printer. Full-screen program-controlled printing. Quiet operation. Compatible with all Timex Sinclair computers

4 rolls extra paper — **\$19.95**

RUN ZX-81 / TS 1000 SOFTWARE ON THE 2068!

The most valuable piece of 2068 software written! The "Upload 2068" will automatically convert ZX-81/TS-1000 BASIC programs into 2068 codes. Many programs can be resaved in the new format but all BASIC programs can be run normally.

Order Up-Load 2000 **\$69.95**

TOP 5 PROGRAMS FOR TIMEX/SINCLAIR

WERE **\$19.95** EACH
YOUR CHOICE **\$7.95** EACH



FLIGHT SIMULATION: Voted in the TOP TEN of Best Programs available for ANY MICROCOMPUTER in the U.K.. True simulation of flying a small aircraft. Excellent educational and pilot instructional aid.

BACKGAMMON: Just try and beat your micro at this game. Full board graphics. Super quick computer responses including doubling cube action for serious action!

VU-FILE: A general purpose filing system with many Database features. Options include: numerical and alphabetical sorting, ascending and descending arrangements and sample file for assisting command operations.

MUNCHYMAN: Newest "Pac" styled arcade game. Super fast M C software makes this the best version seen to date!

VU-CALC: Constructs, generates and calculates large tables for such applications as financial analysis, budget sheets & projections and an immensely powerful analysis chart fully documented.

BASIC COURSE FOR ZX-81/TS-1000/TS-1500

WAS **\$39.95** **\$18.95**



At last, a comprehensive all-in-one learning program for your TIMEX SINCLAIR computer. Designed to teach you to write and develop BASIC programs — no other books or aids are necessary. Every concept, every function is fully described in a simple program that you can enter on your computer in minutes. The complete BASIC course is an excellent reference work for experienced programmers (including tips on using special techniques and machine code) as well as a comprehensive step-by-step guide for complete beginners. The Complete BASIC course has over 240 pages in an attractive durable ring binder. Price now **INCLUDES** all major programs in the BASIC COURSE on two cassette tapes at no extra charge

RUN SPECTRUM SOFTWARE ON THE 2068!

Simply plugs into 2068 port and will run software written for the Sinclair Spectrum. Over 1000 titles available!

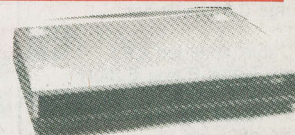
Order no. SP-1 **\$99.95**

New Hardware for Timex Sinclair

TS-2050 Modem

\$229.95 3 or more at
\$215.00 each

- Works with ZX81, TS1000, TS1500, TS2068
- Auto answer, auto dial
- Direct connect — plugs into phone jack
- Includes terminal software
- Perfect companion to Compuserve Starter Package



Now your computer can talk to other computers! Plus there are a wide range of telecommunications data base services to which you can subscribe, from stock market information to shopping to banking. Your TS 2050 modem opens a new world of information to you. Compatible with all Timex Sinclair computers

2068 SOFTWARE & HARDWARE

Home Improvement Planner	\$29.95	Math Wizardry	29.95
Budgeter (C)	39.95	Word Cross	29.95
Personal Portfolio Manager	24.95	Spelling II	29.95
Casino 1 (C)	39.95	Assembler	34.95
Stock Market Simulation	24.95	Personal Accountant	39.95
Pinball (C)	39.95	Voice Chess	39.95
Crossfire	29.95	Gulpman	39.95
Androids	29.95	Backgammon*	29.95
Fun Golf	29.95	Flight Simulation	29.95
Checkbook Manager	29.95	Frogger*	29.95
Circuit Board Scramble*	29.95	Deathchase*	29.95
Auto Analyser	24.95	Quadra-Chart*	29.95
Personal Home Finance	24.95	TV Trivia*	29.95
Time Teacher*	29.95	Game bag for Kids*	24.95
VU-File	29.95	Tasword II (work processor)	89.95
VU-Calc	29.95	Taswide (64 character per line on screen & printer)	49.95
VU-3D	29.95	Tasmath* (trig., algebra)	39.95
Utility 1* (search, sort, and renumber)	29.95	Fraction Zap*	19.95
Utility 2* (sprite graphics)	29.95	Compass* (runs BASIC 60 times faster!)	49.95
		Battleship*	29.95
		Yahtzee*	29.95
		Digital Circuit Designer*	49.95
		A.C. Network Analyser*	49.95
		Purchase Ledger	49.95
		Sales Ledger	49.95
		Business Bank Account	49.95

* = NEW (C) = CARTRIDGE

GLADSTONE ELECTRONIC
Supply Co. Ltd.

1736 Avenue Rd., Toronto, Ontario M5M 3Y7

Order Toll Free
800-268-3640

In Ont. (416) 787-1448

Gladstone Electronics, 1736 Avenue Road, Toronto, Ontario M5M 3Y7 Toll Free Order Line 1-800-268-3640

GLADSTONE'S Inventory Clearout Sale...

We cleaned up our warehouse — and found these specials

ZX-81/TS 1000 Related Books:		Acorn Hardware continued		Audio Department continued		Wire and Parts continued	
Not Only 30 Programs	6.95	Acorn Hardware continued		Ceramic Cartridge, BSR style complete with flip over stylus. Standard half inch mounting centres, with hardware. (was 9.95) sale —	\$3.00 each	wire, connectors, and anything else we have cartons of in our warehouse.	\$4.99
Making the Most of ZX-81	6.95	Cassette Cable	4.50	Guitar Pickup — fits on acoustic guitar for direct plug in to amp. Includes volume & tone control, cable. (Mounting hardware not supplied)	clearance \$9.95	Toggle Switch — Long black handle, 6A — 250V, SPST, with mounting nut.	was 6.95
ZX-81 Pocket Book	9.95	Colour Board	24.00	8 Track Head cleaning System	was \$9.95	1 — 24 clearance 3.00	
Computers for Kids — ZX-81 Ed.	6.95	MB-1 (9V 1.75A pwr. supply)	16.95	Low Capacitance Audio Cable — RCA plug to same. Replaces standard shielded cables for lower noise and better highs. 5 ft. was 9.95. Clearance	\$3.95 each, 10 or more \$2.50 each.	25 — 99 clearance 2.50	
49 Explosive Games — ZX-81	19.95	MB-3 (5V 3A pwr. supply)	29.95	RCA Cable — RCA plug to 2 alligator clips, shielded, 5 ft.	was \$4.00	100 up clearance 2.00	
Software: ZX-81/TS 1000		2114 Memory Chips 20 for	29.95	10 or more	\$1.25	AC Line Cord — 5 ft., white, (was \$3.00)	
Slots	4.95	Work Pack Rom	37.95	25 ft. roll clearance .99		1 — 9 clearance .99	
Planet of Fear	4.95	Programmer's Toolbox	35.00	50 ft. roll clearance 1.90		10 — 24 clearance .89	
Magic Mountain	5.95	Atomcalc spreadsheet	35.00	75 ft. roll clearance 2.89		25 — 99 clearance .79	
Zombies	5.95	Machine Code Monitor/Dis.	35.00	100 ft. roll clearance 3.50		100 up clearance .69	
Constellation	5.95	Vic-20 Hardware		Wire and Parts:		Amtron Kits	
ZX Forth	14.95	16K Plug-in Expansion was \$124.95	\$79.95	300 ohm flat 2 conductor antenna down lead		UK-140 Low Impedance Mic. Preamp.	was 7.95
Stock Market Planning (2 tapes)	12.95	Micro-expansion chassis (plugs into Vic-20 expansion port for connection of two further expansion devices) was \$48.95	\$24.95	25 ft. roll clearance .99		UK-135 Hi Impedance Mic. Preamp.	was 7.95
Business Pack II	5.95	Apple Compatible Hardware		50 ft. roll clearance 1.90		UK-235 Inattentive Driver's Alarm	was \$20.00
Fastword	19.95	Plug In Boards:		75 ft. roll clearance 2.89		UK-275 Universal Mic. Preamp	was \$12.95
Multifile Plus (Data base)	22.95	Speech card — complete with software and manual	\$59.95	100 ft. roll clearance 3.50		UK-920 RF mixer, amp. 2.3-27 Mhz	was \$15.00
Champion Chess	24.95	Integer Card	65.00	2 Conductor Shielded cable (2 wires plus shield). Specify length. Was .70 ft.	clearance .25 ft.	UK-167 RIAA Preamp	was \$22.00
Krakit (an intellectual challenge)	5.95	Disk Interface Card	59.95	Speaker wire — 20 gauge, polarized, high conductance, American made 2 conductor cable, cut to any length.	1 to 1000 ft. clearance .12 ft.	UK-990 C.B. Antenna Noise Filter	was \$12.95
Number Maze/Shell Game	5.95	Z80A Card	59.95	1000 ft. up clearance .09 ft.		EC-100 Code Practice Oscillator	was \$26.95
Yahtzee	5.95	16K Card	69.95	EICO Kits			
Fastload	19.95	80 Column Card	99.95	Remote Control Light Dimmer	\$12.00		
Trackdown in the Old West	4.95	Communications card & Cable	69.95	AM Radio	12.00		
Popstar (A rock & roll game)	4.95	RS-232 Card & Cable	59.95	Decision Maker	8.95		
Around Europe in 80 Hours	4.95	Cooling Fan	59.95	Electronic Mystifier	12.00		
Mathematics Grade 1	9.95	Light Pen Set, complete with software and manual (was \$324.95)	\$199.95	ESP Tester	12.00		
Mathematics Grade 2	9.95	Other Apple Compatible Hardware		BH-16 Bullhorn (Megaphone)	36.95		
Mathematics Grade 3	9.95	Regular style cabinet with Keyboard	119.95	MODE (formerly Jana) Kits			
Mathematics Grade 4	9.95	Numeric Cabinet & Keyboard	189.95	Road Runner	9.95		
Mathematics Grade 5	9.95	Bare Mother Board	39.95	Super roulette wheel	19.95		
Hardware RS-232		48K Mother Board with all ICs fully loaded	395.00	Love-O-Meter	9.95		
Memotech RS-232	99.95	RF Modular with TV Switch and output cable	11.95	Morse Code Practice Oscillator	14.25		
Interface	69.95	80/40 Column Switch	9.95	Curiosity Box	12.00		
Memocalc (Spreadsheet)	69.95	5 Amp Power Supply	89.95	Executive Decision Maker	15.95		
Memotech Z-80 Assembler	69.95	Joystick	29.95	Electronic Shootout (gunfight)	21.95		
Memotech (empty case as used on Rams)	5.00	Cooling Fan	65.00	Audio (LED) Power Meter	19.95		
ZX-81 Edge Card/extender board.	11.95	Apple Related Software		Fish Caller	15.20		
Output Cable (shielded R.F.)	3.50	Wordstar, version 2.2 from MicroPro. Best price ever! (was \$449.95)	\$275.00	Electronic Siren	16.70		
9V/650 ma Timex Power Supply	14.95	Incredible Jack (integrated word-processor, spreadsheet, calculator) was 229.95	\$119.95	Philips Speaker Factory Sale			
ZX Printer Paper (silver) package of 3 rolls	15.00	Audio Department		AD5780M4	5 x 7 oval, 6 watt full rangedual cone 4 ohm	\$ 3.00	
BASICARE System		10 Band Stereo Equalizer, operates in tape monitor circuit	Was \$199.95	AD6980M4	6 x 9 oval, 6 watt full range dual cone 4 ohm	\$ 7.50	
Book "How to Grow into 1 Megabyte with ZX-81"	FREE	Ground Eliminator Kit — from ACE Audio, eliminates audio system ground loops, system hum, and noise, etc. (2 required for stereo) clearance	\$19.95	AD6980M8	same as above, 8 ohm	\$ 7.50	
Personna	79.95	C-90 Audio Magnetics Cassette tape, Low Noise — High Output, 3 tapes per package		AD4691X4	4 x 6 oval, 4 watt, 4 ohm	\$ 4.00	
Minimap	79.95	1 - 9 packs	\$1.99	AD4691M8	4 x 6 oval, 6 watt full range dual cone 8 ohm	\$ 4.00	
Ram 16	69.95	10 - 24 packs	1.75	AD4681P8	4 x 6 oval 6 watt full range single cone 8 ohm	\$ 4.00	
Ram 64	69.95	25 up packs	1.50	AD7062M8	7" octagonal 30 watt full range dual cone 8 ohm	\$ 9.95	
Drom (Battery Back-up)	99.95	NOTE: All clearout merchandise is new and in original packaging, and sold without warranty.		AD7064M8	7" octagonal 20 watt full range dual cone 8 ohm	\$ 7.95	
Toolkit	59.95			AD12100W8	12" 40 watt woofer, 40 oz. mag., rubber surround, 8 ohm	\$39.95	
Pericon A (24 lines I/O)	69.95			AD12100W4	same as above, 4 ohm	\$39.95	
Pericon B (drives relays)	69.95			AD1265W4	12" 30 watt woofer, 16 oz., 4 ohm	\$29.95	
Pericon C (Centronics out)	99.95			AD1265W8	same as above, 8 ohm	\$29.95	
Sonus (3 voice Synthesiser)	79.95			AD1065M8	10" 10 watt full range, dual cone, 8 ohm	\$24.95	
Acorn Atom Related Software				AD1265M4	12" 20 watt full range, dual cone, 4 ohm	\$24.95	
All titles listed below only \$9.95 each. If type ordered is sold out we will substitute a similar tape, unless order specifies other wise.				AD8061W4	same as above, 4 ohm	\$15.95	
Layrinth	Invasion			AD7080M4	7" octagonal 6 watt full range dual cone	\$ 9.95	
Dam Busters	Reversi			AD7080X4	7" octagonal 6 watt M.P. single cone	\$ 9.95	
Stock Broker	3D 0X0			AD2070	2" tweeter, 10 watts round, paper cones specify 4, 8 or 15 ohm	\$ 2.00	
Sketch Pad	Territory			Audax Speakers Factory Sale			
Alien Maze	Condense			HD24B45 10" Bextrene woofer, 35-2k, was \$119.	\$57.95		
Maze Ball	Break Away			HD24B45T 10" Bextrene passive Radiator was \$29.95	\$14.95		
Yan The Park	Junior Games Pack			MHD21B37 8" Bextrene Woofer was \$85.00	\$48.95		

3 Speaker Specials!

①

12" Poly-Propolyne Woofer

*Rated 70 Watts *23 Hz-RES
model 12ACCASP *20-2.5K
Compares with woofers we have



formerly sold for \$65.

only **\$39.95**
buy 4 at \$36.00 each
buy 8 at \$32.00 each

② 12" Heavy Duty Woofer

Listed in previous
catalogue for \$80.00

Now only **\$44.95**

— 8 or more at \$44.00

Rated up to 125 Watts
AD12240/W8 Our all time best selling
woofer with 40 oz. magnet, 2"
v.c., and fundamental resonance of
25 Hz. Rated for amps 15-120 Watts.
For the bass you can feel. Foam
surround.



③

1/2 Price on 8" Woofer

Model 8JN
Rated for 40 Watts

Only **\$14.50**
(was \$28.95)



buy 8 at \$12.50 each
buy 16 at \$10.00 each

Order Form: 3 ways to place an order:

1. Phone our toll line and have credit card ready.
2. Mail order form below to us.
3. School and Institutions — Mail your purchase orders (subject to our acceptance).

CUSTOMER ORDERS TOLL FREE ORDER LINE

1-800-268-3640 In Ontario (416) 787-1440
Orders only

GLADSTONE ELECTRONICS

ORDER FORM

Product Information Phone
(416) 787-1448

GLADSTONE ELECTRONIC SUPPLY COMPANY LIMITED 1736 AVENUE RD. TORONTO ONT. M5M 3Y7 (416) 787-1448

CTLG NO. 39		DATE 19		CHECK IF THIS IS YOUR FIRST ORDER		SHIP VIA BEST <input type="checkbox"/> OTHER	
NAME		PHONE		<input type="checkbox"/> VISA <input type="checkbox"/> M C <input type="checkbox"/> AMEX		NO.	
ADDRESS		APT.		EXP.			
CITY PROV.		CODE		FUNDS ENCLOSED			
(IF DIFFERENT THAN ABOVE)				MONEY ORDER			
NAME		PHONE		CERT. CHEQUE			
ADDRESS		APT.		PERS. CHEQUE			
CITY PROV.		CODE		Allow 3 Weeks Clearance for Personal Cheques C.O.D. Orders Only With 25% Deposit Maximum C.O.D. Amount Is \$200.00			
Order Taken By	Via	Wt	Charges	Pieces	Picker	Date Picked	Origins Of Order
Do Not Use	Stock No.	Page	How Many	Do Not Use	Description - Please Print	Price Each	Total
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							
16							
QL Computer - Flat Rate for shipping in Canada - \$15.00							
Most Orders Are Shipped Within 72 Hours. You Will Be Notified By Mail If There Is Any Delay.				Amount For Goods			
All Shipments Are Fully Insured And Made Via What We Feel Is The Best Carrier (Depending On Your Location).				Shipping (Allow 4%) Minimum \$5.00			
All Merchandise Is Fully Guaranteed. Details Of Warranty Are Supplied With Shipment, Or Available On Request.				Insurance (Allow 1%)			
				7% Tax (Ont. Residents Only)			
				Amount I Owe From Previous Order (Or Credit) Enclose Green Copy			
				Total Amount Enclosed			
				C.O.D. - Deposit			
				Overage Will Be Credited To You			
				Please Make A Note Of Information On This Form For Your Records			

Please visit our store — centrally located in Toronto.

Catalogue — \$5.00

Order our speaker kit catalogue. Contents will include full specs on Kef, Phillips, Celestion, Motorola, Dynaudio, Falcon, Audax, Poly Linear, Marsland, and more brands; as well as cabinet designs, theory, our latest price list, and speaker builder information on our most popular kits. The price for our speaker kit catalogue is \$5.00, and will be published in May, 1985. Reserve your copy now.

Gladstone Electronics serving Canada for 20 years.

Order with full confidence from Gladstone Electronics

This is our 20th year in operation! We have seen many companies come and go in that time, but we will be here to serve you now and in the future. We can still service many products we have sold 20 years ago! Gladstone's has shipped over 45,000 orders to our customers all over Canada. We will get it to you fast, on time, and in one piece. Order with confidence from Gladstone Electronics.

About our prices

All prices and specifications are subject to change without notice. Should there be a change that we feel is significant, we will notify you by mail prior to making shipment.

About our toll free order line 1-800-268-3640

Operators are equipped to take orders only, and cannot answer enquiries. Toll free lines are provided to place your order from anywhere in Canada at no cost to the caller. Please have your Visa, Master Card, or American Express card ready when calling, and be prepared to tell the operator what you would like to order.

Hours of operation (Toronto time)

Mon., Tues., Wed., Fri., Sat., 9:30 a.m. to 6:00 p.m.
Thurs. 9:30 a.m. to 9:00 p.m. Sunday Closed

Warranty

All merchandise sold by Gladstone Electronics is guaranteed against defects in manufacture by ourselves as well as the manufacturer for at least 90 days from the date of sale. Many items are warranted longer. Please write if you require further information on warranty.

Shipping and insurance

All merchandise shipped by Gladstone Electronics is fully insured by an independent insurance company. Our volume shipping gives us best rates with all major carriers across Canada.

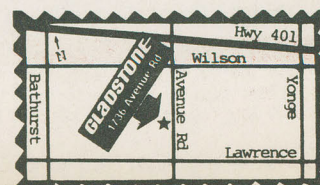
All merchandise is shipped F.O.B. our warehouse, Toronto. Cost of shipping and insurance will be added to your order. The minimum rate for shipping is \$5.00. Rate will vary depending on shipment weight, and destination.

Returns

If you encounter difficulties with any product purchased from Gladstone, please write to us and explain the nature of the difficulty. Most times we are able to correct the problem via mail, or advise you of your nearest warranty station. Should we determine that the item should be returned to us for inspection, we will forward RMA (Return Merchandise Authorization) sticker for the outside of the package. Returns will be refused unless they bear our RMA sticker.



Its easy to get to
Gladstone Electronics



GLADSTONE ELECTRONICS 1965 - 1985

Twenty years of innovation in new products and technology to the Canadian marketplace.

For twenty years Gladstone Electronics has been the leader in introducing exciting new products featuring innovations in technology to the Canadian marketplace. While other companies come and go, you can depend on Gladstone Electronics to continue to offer you state of the art products at competitive direct prices.

Twenty years of serving consumers, industry, government, business, education, hobbyists and experimenters.

**Cross Canada Direct Service. Toll-free telephone order line.
1-800-268-3640**

**Look to the leader, Gladstone Electronics, for all
computer, audio, and electronics products!**



Thandar Test Instruments

For professional applications, servicemen, hobbyists, and students ... THANDAR instruments offer the utmost in accuracy and reliability at outstanding prices.


Gladstone Electronics has been selling Thandar instruments for more than six years. Many hundreds of satisfied users can attest to THANDAR's performance and reliability under even the most adverse conditions.

THANDAR instruments are conservatively rated so that their actual performance usually exceeds published specifications. Designed by demanding engineers using innovative techniques and the best components available, THANDAR instruments will provide many years of service.

**CONTACT GLADSTONE
ELECTRONICS FOR MORE
INFORMATION ON ANY THANDAR
PRODUCT LISTED IN THIS
CATALOGUE.**

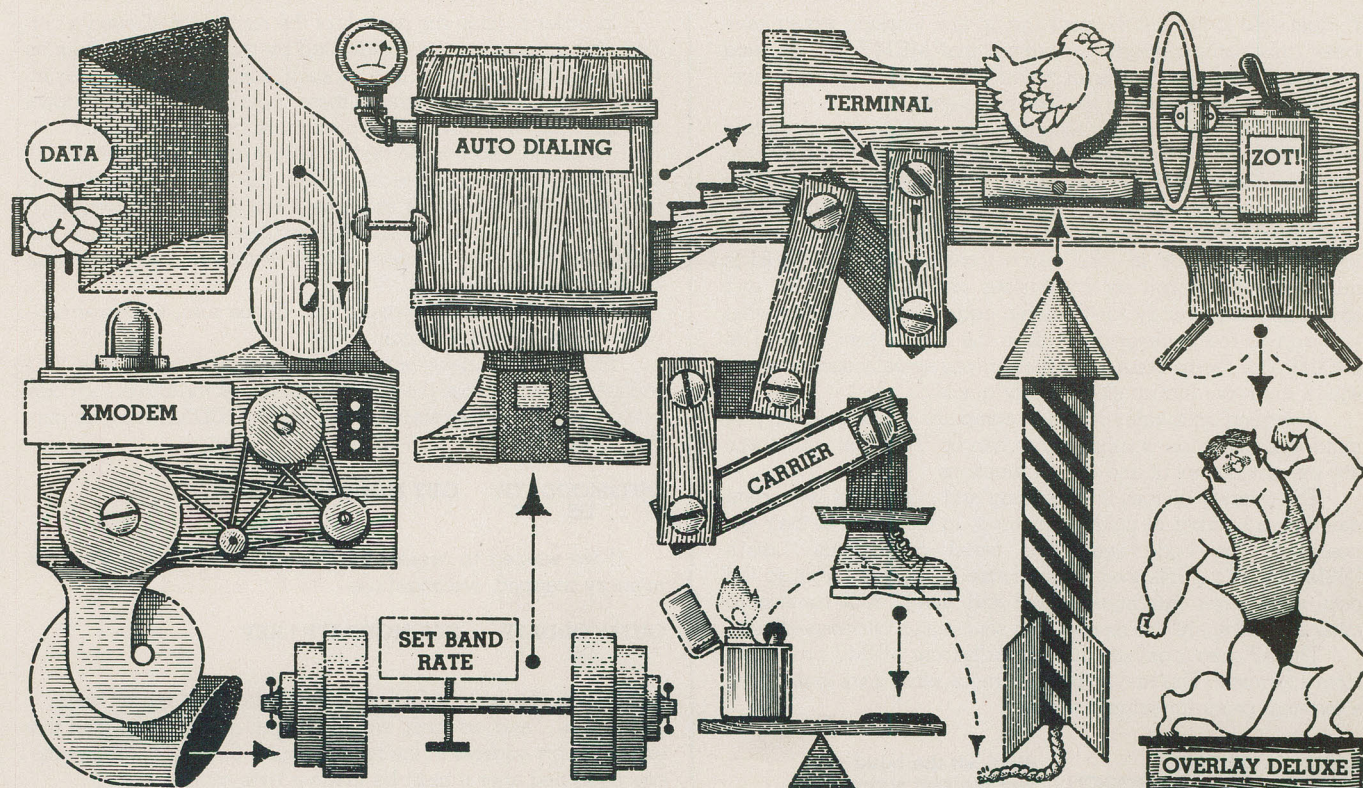
GLADSTONE  ELECTRONICS

**Supply Co. Ltd.
1736 Avenue Rd., Toronto, Ont. M5M 3Y7**

	Canada Post Postage paid	Postes Canada Port payé			
Bulk third class			En nombre troisième class		
10346 Toronto					

RETURN REQUESTED

The Art of The MDM Overlay



If you've sat down to write an MDM7 overlay for your computer you'll probably appreciate how involved the process can be. Here's a look at some techniques for creating the overlay of the gods.

by Steve Rimmer

There was a time when MODEM7 packages were very uncivilized, and it would have been largely impossible to have talked about the patching of the this most useful of telecommunications programs in a general sense. Depending upon which version of the program you happened to have acquired, what hacks had been made to it by the last soul that possessed it and other profound considerations, such as the colour of your postman's socks, the patching needed to adapt it to a specific machine could range from changing a few equates to adding twenty kilobytes of code.

Making a version of MODEM7 work on your computer is, nonetheless, a worthwhile enterprise. Having gotten it going one has immediate access to megabytes worth of software all available for free on public domain bulletin boards. More sophisticated uses for MODEM7 include moving files between dissimilar... and largely incompatible... computers.

Their potential utility, however, never really did make the MODEM programs any easier to get going. They are among the most temperamental little nasties available.

The successors to the nine million versions of MODEM7, the MDM trips, are a lot easier to work with and an order of magnitude easier to patch and make cool. Among other things, they have all their nasty system dependant bits concentrated in a block of code which is overlayed, that is, replaced with your own

routines. This makes them potentially a lot easier to work with, as you don't have to manipulate a massive program, skipping through it to look for the hardware dependant aspects of it.

We looked at how the overlay code for MDM works in the July 1984 edition of Computing Now!. In this feature we'll look at an example of what the system specific code can look like, and some of the techniques one can use to render it more than just a quick patch.

It would probably be a good trip to check out the July article again if you aren't all that familiar with the bits and bytes.

Overview

Both MDM7 and a full size blue Chevy pickup full of system specific overlays are available in the public domain. However, it can be said of some of these latter things, at least, that they only work in the theoretical sense. They are useable in the same way that a teletype is useable as a terminal. They'll make the package go, but they won't make it very much fun to use.

This, of course, is a drag, because MDM7 is such a powerful little brute. It has heaps of features and options, all of which can make your life much more real if they're supported by the overlay.

The overlay shown here is a fairly powerful example of what these things are all about. While a bit trickier to write than a low

The Art of The MDM Overlay

budget deal to just get the package up and working would have been, this code supports everything that MDM7 can do, and handles a number of low level system functions a lot more conveniently than would one of the low rent versions.

The first and potentially the most limiting restriction in writing an MDM7 overlay is the space you have to do it in. If you want to retain the dialing code of the package, which resides immediately below the overlay space the overlay must end before 0400H.

This does not, however, allow you anything like this much room to write code in. The space from 0100H to 01A8H is unrepentantly spoken for by various configuration bytes and jumps into the overlay for the main code block. As such, what you add to the package must fit in the space from 01A8H to 0400H. This seems like a lot, but when you actually start working with it the room fills up exceedingly quickly.

In writing an overlay for your computer you should keep in mind what the code is supposed to handle. To begin with, there are the obvious input and output functions.

The overlay divides the inputting and outputting of modem data into a number of unique functions. In the order of their appearance, the code wants the serial port status... that's IN\$MODCTL1... followed by a routine to send data out to the port, then to get data into the port and, finally, four routines to mask and compare the receive and send status bits respectively.

This all goes together, through calls from MDM7 proper, to form a terminal. This may make a bit more sense if we look at how a terminal program actually works.

CALL	INITMOD	:first, set the baud rate
REMOTE:	CALL IN\$MODCTL1	:get the port status byte
CALL	ANISMODRCVB	:mask off the receive status
CALL	CPISMODRCVR	:see if it's set
JNZ	LOCAL	:check local if not
CALL	IN\$MODDATP	:otherwise, get the remote data
CALL	CONOUT	:and show it on the screen
LOCAL:	CALL CONSTAT	:see if there's a keyboard char
JNZ	REMOTE	:if not, back to the serial port
CALL	CONIN	:otherwise get the keyboard char
CALL	OUT\$MODDATP	:and send it to the serial port
JMP	REMOTE	:loop again

This is a simplified terminal couched in the terms used in the overlay code. However, looking at the component bits this way it's fairly easy to see what the functional blocks do.

To begin with, we have to initialize the serial port, and possibly the modem. This is, in fact, the aspect of the code which takes the most work, since it is in initializing the serial port that we will be setting up the baud rate and suchlike.

We'll be having a more detailed look at this stuff in a bit.

The terminal itself is comprised of a large loop which runs from REMOTE down to the jump at the bottom of this little program. In fact, it consists of two smaller sections which perform analogous functions. The top half operates on data coming in from the serial port... the remote console... while the bottom bit handles data coming from the keyboard, not surprisingly the local console.

The steps involved in each of these can be seen as follows. The first thing to do is to check the status of the console in question. If there is no character waiting, the program must jump to the start of the other section and check for a character there. If both consoles are idle the program will loop back and forth like this indefinitely. If there is a character ready at the console, it will get it and send it out to the other console. Having gotten this together, the program resumes looping, waiting for another character.

In order to fill in the serial part of the routines is allowed a certain amount of space, as is indicated by the location markers on the far right of the listing, and, as such, complex routines may involve putting JMP statements in these spots pointing further down into the overlay where there's a bit more breathing room.

It's unspeakably important to assure that these routines all start where they're supposed to. When the MDM7 code wants to initialize the serial port, for example, it will call location 0168H. If the jump to this code is somewhere else your computer will transmute itself into a three headed Venusian gas lizard and swallow itself tail first.

At least, I think that's what it'll do. To be sure, whatever happens will be uncool to watch.

To this end, make sure that in writing these simple I/O routines that you fudge the DS things to reflect the size of the code you've written. For example, the OUT\$MODDATP routine currently consists of

```
OUT$MODDATP:  OUT MODDATP ! RET
              DS      7
```

If we wanted to create an overlay for an Apple, which is memory mapped, we might use

```
OUT$MODDATP:  STA MODDATP ! RET
              DS      6
```

In this case, the label MODDATP would be a sixteen bit value... an address... and, as such, would take up a byte more than the eight bit port address in the first example. Correspondingly, the space defined after it must be made a byte smaller.

If you are going to radically hack this part of the overlay you can check the SYM listing produced by the assembler against the memory locations in this overlay to make sure everything's wound up where it's supposed to.

Now... the Fun Part

Actually, the rest of the overlay is a lot more interesting to write, and rather less critical. This is, in fact, where you can really get away with nothing at all... or you can really shine.

The rest of the overlay does what amounts to the system specific human engineering for your computer. For the most part this involves handling the baud rate setup and port initialization.

Most simple overlays make the port default to three hundred baud and offer a few other speeds using the MDM7 SET command. This is a drag if your hardware can handle lots of baud rates. You may well want the higher ones, for example, to transfer data through a hard wire between computers some time in the future.

This overlay, for example, will set the port of the computer it was written for to anything up to a hundred and ninety-two kilobaud. MDM7 runs like a rabbit on speed at this rate... it's a party for moving files between systems.

There are two things which I think the baud rate setup should do... and that most overlays don't. To begin with, it should read the default baud rate byte at MSPEED, location 107H in the overlay, and set the port up accordingly. As such, one could change the default baud rate with DDT by simply altering this byte.

Secondly, it should tell you what baud rate the port is set to when the program is booted and when you use the SET command.

It should also allow for the disabling of the auto baud rate setup feature. In this version, whether or not the port is initialized

to the baud rate set by MSPEED or to three hundred baud, as most overlays do it, is determined by the setting of the EXTRA1 byte at 11EH, which I've renamed to BAUDINT here for the occasion.

The code to handle the automatic baud rate setup is a bit tricky. Normally this sort of thing is fairly simple, but in this case there isn't much room to bounce around in. If you glance down toward the bottom of the listing you'll find a host of little routines, starting with OK110. As it happens, probably due to celestial intervention when the 8080 chip was devised, these routines are eight bytes long. This is rather handy, as eight is an easy number to work with.

If we take the location of OK110 as a base and add eight times the value of the MSPEED byte the result will be a pointer to the corresponding setup routine. I know this sounds like fractured mathematics, but it works extremely well. The value of the accumulator can be multiplied by eight by rotating it left three times.

```

;-----
;
; Overlay Delux Example
; A typical MDM7 overlay file
; For a generic computer
; Copyright (c) 1985
;-----

; NOTE THAT THE LINES OF CODE THAT WILL PROBABLY WANT CHANGING TO SUIT
; YOUR HARDWARE ARE MARKED WITH ASTERISKS AT THE FAR RIGHT

BELL: EQU 07H
CR: EQU 0DH
ESC: EQU 1BH
LF: EQU 0AH

YES: EQU OFFH
NO: EQU 0

PORTA EQU YES ;SET ONE TRUE TO SELECT ONE
PORTB EQU NO ;OF TWO AVAILABLE SERIAL PORTS

IF PORTA
BAUDRG: EQU 00H ;BAUD RATE GENERATOR ADDRESS *
PORT: EQU 04H ;SERIAL DATA PORT *
MODCTL1: EQU PORT+2 ;SERIAL STATUS PORT *
MODDATP: EQU PORT ;MODEM DATA PORT *
MODCTL2: EQU PORT+2 ;MODEM STATUS PORT *
ENDIF

IF PORTB
BAUDRG: EQU 00H ;BAUD RATE GENERATOR ADDRESS *
PORT: EQU 05H ;SERIAL DATA PORT *
MODCTL1: EQU PORT+2 ;SERIAL STATUS PORT *
MODDATP: EQU PORT ;MODEM DATA PORT *
MODCTL2: EQU PORT+2 ;MODEM STATUS PORT *
ENDIF

MODRCVB: EQU 01H ;BIT TO TEST FOR RECEIVE
MODRCVR: EQU 01H ;MASK FOR READY TO RECEIVE
MODSNDB: EQU 04H ;BIT TO TEST FOR SEND
MODSNDR: EQU 04H ;MASK FOR CLEAR TO SEND

ORG 100H

DS 3 ;(for "JMP START" instruction)

PMMIMODEM: DB NO ;yes=PMMI S-100 Modem 103H
SMARTMODEM: DB YES ;yes=HAYES Smartmodem, no=non-PMMI 104H
TOUCHPULSE: DB 'P' ;T=touch, P=pulse (Smartmodem-only) 105H
CLOCK: DB 40 ;clock speed in MHz x10, 25.5 MHz max. 106H *
;20=2 Mhz, 37=3.68 Mhz, 40=4 Mhz, etc.
MSPEED: DB 9 ;0=110 1=300 2=450 3=600 4=710 5=1200 107H
;6=2400 7=4800 8=9600 9=19200 default
BYTDLY: DB 1 ;0=0 delay 1=10ms 5=50 ms - 9=90 ms 108H
;default time to send character in terminal mode file transfer for slow BBS.
CRDLY: DB 1 ;0=0 delay 1=100 ms 5=500 ms - 9=900 ms 109H
;default time for extra wait after CRLF
;in terminal mode file transfer
NOOPCOL: DB 5 ;number of DIR columns shown 10AH
SETUPTST: DB YES ;yes=user-added Setup routine 10BH
SCRNTST: DB YES ;Cursor control routine 10CH
ACKNAK: DB YES ;yes=resend a record after any non-ACK 10DH
;no=resend a record after a valid NAK
BAKUPBYTE: DB YES ;yes=change any file same name to .BAK 10EH
CRCDFLT: DB YES ;yes=default to CRC checking 10FH
TOGGLECRC: DB YES ;yes=allow toggling of CRC to Checksum 110H
CONVBKSP: DB NO ;yes=convert backspace to rub 111H
TOGGLEBK: DB YES ;yes=allow toggling of bksp to rub 112H
ADDF: DB NO ;no=no LF after CR to send file in 113H
;terminal mode (added by remote echo)

```

```

TOGGLELF: DB YES ;yes=allow toggling of LF after CR 114H
TRANLOGON: DB YES ;yes=allow transmission of logon 115H
;write logon sequence at location LOGON
SAVCCP: DB YES ;yes=do not overwrite CCP 116H
LOCONEXTCHR: DB NO ;yes=local command if EXTCHR precedes 117H
;no=external command if EXTCHR precedes
TOGGLELOC: DB YES ;yes=allow toggling of LOCONEXTCHR 118H
LSTTST: DB YES ;yes=printer available on printer port 119H
XOFFTST: DB NO ;yes=check for XOFF from remote while 11AH
;sending a file in terminal mode
XONWAIT: DB NO ;yes=wait for XON after CR while 11BH
;sending a file in terminal mode
TOGXOFF: DB YES ;yes=allow toggling of XOFF checking 11CH
IGNORCTL: DB YES ;yes=CTL-chars above &M not displayed 11DH
BAUDINT: DB YES ;yes=auto baud init 11EH
EXTRA2: DB 0 ;for future expansion 11FH
BRKCHR: DB 'B'-40H ;&B = Send a 300 ms. break tone 120H
NOCNNECT: DB 'N'-40H ;&N = Disconnect from the phone line 121H
LOGCHR: DB 'L'-40H ;&L = Send logon 122H
LSTCHR: DB 'P'-40H ;&P = Toggle printer 123H
UNSAVE: DB 'R'-40H ;&R = Close input text buffer 124H
TRANCHR: DB 'T'-40H ;&T = Transmit file to remote 125H
SAVECHR: DB 'Y'-40H ;&Y = Open input text buffer 126H
EXTCHR: DB 'k'-40H ;&k = Send next character 127H

IN$MODCTL1: DS 2 ; 128H
MVI A,10H ;FUDGE INTERRUPT 12AH *
OUT MODCTL1 *
IN MODCTL1 ;GET STATUS *
RET *
DS 3 *

OUT$MODDATP: OUT MODDATP ! RET ;SERIAL DATA OUT 134H
DS 7
IN$MODDATP: IN MODDATP ! RET ;SERIAL DATA IN 13EH
DS 7
ANI$MODRCVB: ANI MODRCVB ! RET ;CHECK FOR READY TO RECEIVE 148H
CPI$MODRCVR: CPI MODRCVR ! RET ;SEE IF BIT IS SET TO RECEIVE 14BH
ANI$MODSNDB: ANI MODSNDB ! RET ;CHECK FOR CLEAR TO SEND 14EH
CPI$MODSNDR: CPI MODSNDR ! RET ;SEE IF BIT IS SET TO SEND 151H
DS 6 ; 154H
OUT$MODCTL1: OUT MODCTL1 ! RET ;OUT TO SERIAL STATUS PORT 15AH
OUT$MODCTL2: OUT MODCTL2 ! RET ;SAME AGAIN... 15DH

LOGONPTR: DW LOGON ;POINTER TO "HELLO" 160H
DS 6 ; 162H
JMP$GOODBYE: JMP GOODBYE ; 168H
JMP$INITMOD: JMP INITMOD ;JUMP TO PORT INITIALIZER 16BH
RET ! NOP ! NOP ;(by-passes PMMI routine) 16EH
RET ! NOP ! NOP ;(by-passes PMMI routine) 171H
RET ! NOP ! NOP ;(by-passes PMMI routine) 174H
JMP$SETUPR: JMP SETUPR ; 177H
JMP$SPCLMENU: JMP SPCLMENU ; 17AH
JMP$SYSVER: JMP SYSVER ; 17DH
JMP$BREAK: JMP SENDBRK ; 180H
; Do not change the following six lines.
JMP$ILPRT: DS 3 ; 183H
JMP$INBUF: DS 3 ; 186H
JMP$INLNCOMP: DS 3 ; 189H
JMP$INMODEM: DS 3 ; 18CH
JMP$NXTSCRN: DS 3 ; 18FH
JMP$TIMER: DS 3 ; 192H

; Clear sequences -- CLREOS is clear to end of screen, CLRSCRN is clear
; entire screen. Last entry must be 0. Any other 0's act as NOP's.
CLREOS: CALL JMP$ILPRT ; 195H
DB 11h,0,0,0,0 ; 198H *
RET ; 19DH

CLRSCRN: CALL JMP$ILPRT ; 19EH
DB 1Ah,0,0,0,0 ; 1A1H *
RET ; 1A6H

SYSVER: CALL JMP$ILPRT ; 1A7H
DB '[ Overlay for an obscure computer ]'
DB '[ Copyright 1985 (c) Steve Rimmer ]',0
RET

; IF THE TRANLOGON BYTE IS TRUE, THIS MESSAGE WILL HAPPEN IF YOU
; HIT CONTROL O
LOGON: DB 'Hello',0

; THIS SENDS A 300 MS BREAK TONE TO RESET TIME SHARING COMPUTERS
SENDBRK: MVI A,5 ;YOU CAN LARGELY IGNORE *
OUT MODCTL1 ;THIS ROUTINE FOR MOST *
MVI A,0F8H ;APPLICATIONS... *
JMP GOODBYE1 ;

; THIS HANGS UP THE PHONE, MAKING THE DTR LOW AND SENDING A BRK TONE
GOODBYE: MVI A,5 ; *
OUT MODCTL1 ;TO THE STATUS PORT *
MVI A,68H ;SET DTR LOW *

;
GOODBYE1: OUT MODCTL1 ;SET DTR LOW NOW *
MVI B,3 ;WAIT FOR 300 MS. *
CALL JMP$TIMER *
MVI A,5 *
OUT MODCTL1 ;SET DTR HIGH AGAIN *
MVI A,0E8H ;RESTORE PARAMETERS *
OUT MODCTL1 *
RET

```


The Art of The MDM Overlay

; THIS INITIALIZES THE PORT, SETS THE BAUD RATE AND SO ON

```
INITMOD: MVI A,0 ;SELECT REGISTER
OUT MODCTL1
MVI A,18H ;SET TO RECEIVE COMMAND
OUT MODCTL1
MVI A,04H ;SELECT REGISTER
OUT MODCTL1
MVI A,44H ;SET PARAMETERS
OUT MODCTL1
MVI A,03H ;SELECT REGISTER
OUT MODCTL1
MVI A,0C1H ;ENABLE RECEIVE
OUT MODCTL1
MVI A,05H ;SELECT REGISTER
OUT MODCTL1
MVI A,0EAH ;ENABLE SENDING
OUT MODCTL1

;
LDA BAUDINT ;SEE IF AUTO BAUD RATE SETUP
CPI YES ;IF NOT ENABLED, JUST INITIALIZE
JNZ INITMOD1
```

; AUTO BAUD RATE SETUP
; IF ENABLED, THIS CODE LOOKS AT THE MSPEED BYTE AND SETS THE
; BAUD RATE ACCORDINGLY. TO DISABLE, MAKE THE BAUDINT BYTE 0

```
DEFBD: LDA MSPEED ;SEE WHAT THE DEFAULT SPEED IS
RLC ;MULTIPLY BY 2
RLC ;... BY 4
RLC ;... BY 8
LXI D,0 ;MAKE D = A
MOV E,A
LXI H,OK110 ;POINT TO FIRST BAUD RATE
DAD D ;ADD OFFSET
PCHL ;AND JUMP TO IT
```

```
INITMOD1: MVI A,1 ;DEFAULT TRANSFER TIME TO 300 BAUD
STA MSPEED ;SET UP MSPEED BYTE ACCORDINGLY
```

```
CALL JMP$ILPRT ;SAY IT
DB CR,LF,'Baud rate ',0
LDA MSPEED ;GET MSPEED BYTE
LXI H,STR110 ;POINT TO VECTOR TABLE
RLC ;MULTIPLY MSPEED BY 2
LXI D,0 ;MAKE D = A
MOV E,A
DAD D ;H IS POINTING TO VECTOR
MOV E,M ;GET LOW ORDER VECTOR BYTE
INX H ;BUMP H POINTER
MOV D,M ;GET HIGH ORDER VECTOR BYTE
XCHG ;H NOW POINTS AT STRING
MOV A,M ;GET A BYTE OF THE STRING
CPI 0 ;IF IT'S ZERO, WE'RE DONE
JZ INITMOD2 ;OTHERWISE,
MOV E,A ;SET UP TO DO CONOUT BDOS CALL
MVI C,2 ;
PUSH H ;SAVE THE POINTER
CALL 5 ;AND PRINT THE BYTE
POP H ;RESTORE THE POINTER
INX H ;BUMP IT
JMP INITLP ;AND LOOP 'TIL DONE
```

```
INITMOD2: MVI A,05H ;INITIALIZE TO 300 BAUD
OUT BAUDRG ;AND SET THE BAUD RATE. NOTE THAT
RET ;THE 05 WILL BE OVERWRITTEN BY SETBAUD
```

```
STR110: DW SEE110 ;THE TABLE OF POINTERS TO THE STRINGS
STR300: DW SEE300
STR450: DW NOSEE
STR600: DW SEE600 ;NO 450 BAUD
STR710: DW NOSEE ;NO 710 BAUD
STR1200: DW SEE1200
STR2400: DW SEE2400
STR4800: DW SEE4800
STR9600: DW SEE9600
STR192: DW SEE192
```

; Setup routine to allow changing modem speed with the SET command.

```
SETUPR: LXI D,BAUDBUF ;POINT TO NEW INPUT BUFFER
CALL JMP$ILPRT
DB 'Select a baud rate: '
DB '110, 300, 600, 1200, 2400, 4800, 9600, 19200: ',0
CALL JMP$INBUF
LXI D,BAUDBUF+2
CALL JMP$INLNCOMP ;COMPARE BAUDBUF+2 WITH CHARACTERS BELOW
SEE110: DB '110',0 ;IS IT "110"?
JNC OK110 ;IF SO, LEAP TO SETUP
CALL JMP$INLNCOMP ;AND SO FORTH
SEE300: DB '300',0
JNC OK300
CALL JMP$INLNCOMP
SEE600: DB '600',0
JNC OK600
CALL JMP$INLNCOMP
SEE1200: DB '1200',0
JNC OK1200
CALL JMP$INLNCOMP
SEE2400: DB '2400',0
JNC OK2400
CALL JMP$INLNCOMP
SEE4800: DB '4800',0
JNC OK4800
```

```
CALL JMP$INLNCOMP
SEE9600: DB '9600',0
JNC OK9600
CALL JMP$INLNCOMP
SEE192: DB '19200',0
JNC OK192
```

```
CALL JMP$ILPRT
NOSEE: DB 'not available.',CR,LF,BELL,0
JMP SETUPR ;TRY AGAIN
```

```
OK110: MVI A,0
LHLD BD110
JMP LOAEBD
```

```
OK300: MVI A,1
LHLD BD300
JMP LOAEBD
```

```
OK450: JMP INITMOD1
DS 5 ;PLACE HOLDER FOR 450
```

```
OK600: MVI A,3
LHLD BD600
JMP LOAEBD
```

```
OK710: JMP INITMOD1
DS 5 ;PLACE HOLDER FOR 710
```

```
OK1200: MVI A,5
LHLD BD1200
JMP LOAEBD
```

```
OK2400: MVI A,6
LHLD BD2400
JMP LOAEBD
```

```
OK4800: MVI A,7
LHLD BD4800
JMP LOAEBD
```

```
OK9600: MVI A,8
LHLD BD9600
JMP LOAEBD
```

```
OK192: MVI A,9
LHLD BD192
JMP LOAEBD ;THIS ONE ISN'T REALLY NECESSARY
LOAEBD: STA INITMOD1+1 ;CHANGE MSPEED
MOV A,L ;GET BAUDRATE BYTE
STA INITMOD2+1 ;MODIFY INITMOD ROUTINE
JMP INITMOD1 ;AND SET UP THE BAUD RATE
```

; TABLE OF BAUDRATE PARAMETERS

```
BD110: DW 0002H
BD300: DW 0005H
BD600: DW 0006H
BD1200: DW 0007H
BD2400: DW 000AH
BD4800: DW 000CH
BD9600: DW 000EH
BD192: DW 000FH
```

```
BAUDBUF: DB 10,0 ;CONSOLE BUFFER TO ENTER BAUD RATE
DS 10
```

```
SPCLMENU: RET ;THIS ISN'T USED. JUST LEAVE IT HERE
ZZZEND: EQU $ ;THIS VALUE MUST BE LESS THAN 0400H
;TYPE OVERLAY.SYM TO SEE IT
```

If you check out DEFBD you'll see how this works. A pointer is devised into the appropriate OK routine and used to fill the program counter with the infrequently used PCHL instruction.

Using this approach it is not only high tech to use as many of the available baud rates as possible... it's almost essential. Because the pointer into the OK routines moves in increments of eight bytes, there has to be a routine every eight bytes and it has to be the right one. This computer couldn't support four-fifty or seven hundred and ten baud and, as a result, I've had to fudge these with dummy jumps to keep the spacing right.

The function of the OK routines is twofold. They can be called from either the initial setup routines or through the SET command from MDM, so they must get the parameters to set up the port and they have to change the byte at MSPEED. This latter bit is, admittedly, redundant when they're called from the initialization.

In most cases the baud rate parameter is a sixteen bit word. It usually takes the form of the upper and lower bytes of a divisor. This particular computer uses an 8116 baud rate generator,

which only allows for a fixed set of commonly used baud rates. As such, only four bits are required to select a rate. I've preserved the sixteen bit table here, however, to illustrate what it would look like if it were all being used.

The LOADBD routine is what actually sets the baud rate... and, of course, it will have to be changed to suit your hardware, as must the table of baud rates beneath it. In most cases, it will treat the two eight bit halves of the HL register as individual values, moving them to the accumulator and sending them out to the appropriate ports.

Strings

The final bit of nuance which I feel an overlay should possess if it really wants to be able to call itself an overlay is the facility for telling you which baud rate you've selected after you've selected it. This is only of trifling importance when the SET command is used... you should know what you've typed in, after all... but it's decent when you first boot the program. As this overlay can be easily set up to initialize itself to different baud rates by just changing the MSPEED byte with DDT, it's quite easy to wind up with a number of versions of MDM, all having differing parameters on starting up.

Yes, you can look at the status page when you first sign onto the cruise, but that's so low tech it hardly bears thinking about.

It's not at all difficult to have the system print out the baud

that is, multiplies it by two. If the HL register points to STR110, adding A to it will have it pointing to the string corresponding to the baud rate in A.

The overlay won't let one select invalid baud rates, like seven hundred and ten baud in this case, but it is possible to set MSPEED to default to this value. As such, since the table needs dummy place holders anyway we'll have these pointers aim at the string that says "not available".

Classic Baud

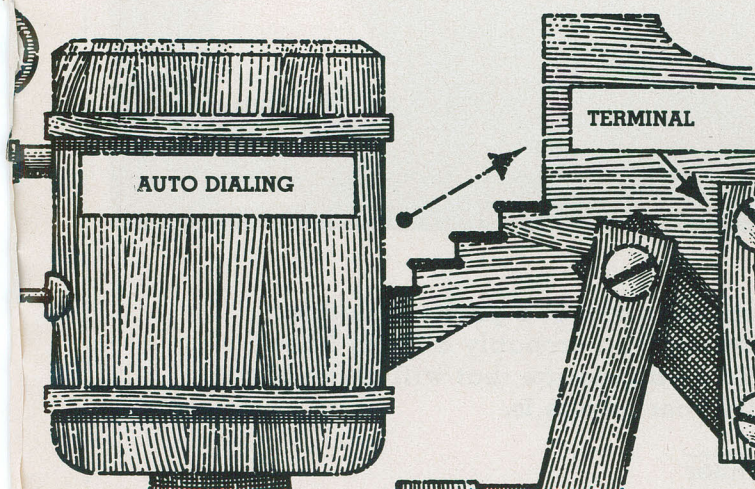
Even the simplest modem program can transfer files. The MDM7 deals can make transferring them kind of executive and high tech. However, a lot depends on your overlay.

You can, of course, create still more sophisticated overlays by obtaining the source for one of the MDM7s and re-assembling it with more room before the dialing code. I mean, you can have full screen menus, colour, sound effects and a mouse interface, cognitive error trapping, speech recognition... probably best to skip the speech recognition part, actually.

A well designed MDM overlay is a sort of eternal thing. It'll make adapting the package to different tasks moderately painless, and will assist you in carrying out the grand purpose of Western civilization, showing off for your friends.

A hundred and ninety-two kilobaud looks so slick, y'know.

CNI



rate, at least, not in a programming sense. However, there isn't really enough spare room in the overlay to do this here. As such, getting it together requires some stealth.

The SETUPR routine compares the data inputted into BAUD-BUF to a series of fixed strings, these strings being the baud rates. Checking this out, we might note that these are the very strings we would need to print out if we wanted to say what the baud rate is.

Unfortunately, unlike as in the case of the OK routines, these strings do not occur at convenient regular intervals, as they are not of a constant length. We can't just fudge an offset and derive a pointer to the strings based on the value of MSPEED... at least, not directly.

The table at STR110 is the way around it. By assigning each string a label and then creating a table consisting of these labels we've set up a structure which can be manipulated with relatively little effort.

To select a baud rate string based on the value of MSPEED the INITMOD1 routine gets MSPEED in A and rotates it left once,

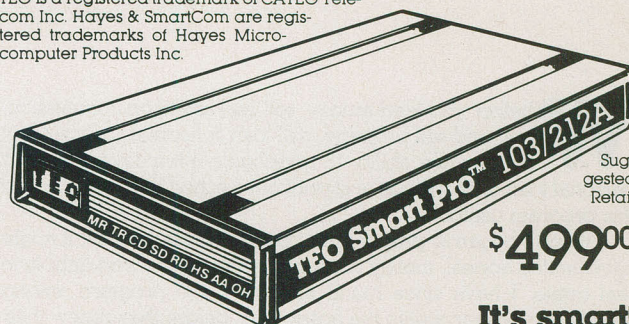
The Smart Money Modem.

TEO™ SmartPro™ 103/212A Hayes™ Compatible

CONSIDER THESE FEATURES:

- 300/1200 baud • Intelligent microprocessor • Auto answer and auto dial • User selectable ring delay for auto answer • Auto selection of transmission speed • Self test capability • Full or half duplex • Hayes™ command compatible (works with SmartCom™ and CrossTalk™) • Tone and pulse dialing • Built-in speaker and volume control • Switch selectable power-up defaults • Full complement of status lights • User selectable ring delay for auto answer.

TEO is a registered trademark of CATEO Telecom Inc. Hayes & SmartCom are registered trademarks of Hayes Microcomputer Products Inc.



Suggested
Retail

\$499⁰⁰

TEO

TECHNICAL EXCELLENCE IN OPERATION

TEO Computers & Peripherals Inc.

275 Steelcase Road East, Markham, Ontario L3R 1G3
Telex 06-986867, CATEO Tel. (416) 474-9372

Circle No. 26 on Reader Service Card

**It's smart!
It's a good value!**

Dealers & Distributors
enquiries invited.

The Mortgage Program



The word *mortgage* is from the Latin *mortuus*, to die, and *gage*, to pledge... in other words, a death pledge. If you have one you probably already knew that even if you don't understand Latin. Here's a program that will help you calculate just how deadly your pledge is.

by Jim Buchner

Whether you lend money, sell real estate on commission, buy and sell property, sell loan schedules, or just want to have the ability to investigate alternatives on your personal loan or mortgage and print out a schedule, you may find this program useful.

When I began to prepare this program I thought that it might have limited appeal, mainly for persons like myself who dabble in real estate. I have since found interest in the program among friends who wish to weigh the possibilities before they renew their mortgages, and another who works full time in real estate.

The program makes it possible to examine alternative mortgage variables like interest rates, the time interval between payments, the amortization period, the number of compoundings per annum and the period of time which the loan will be allowed to run. Then, if the user likes the result, a schedule can be printed.

In the Code

There are several things unique about this program. The payments may be made at one, two, three, four, six or twelve month intervals. The compounding may be semi-annual or at such other interval as desired... but do note that semi-annual compounding is standard. The amortization period need not be a whole number of years but can be any number of years and months you choose. The interest rate and principal amount can be any decimal numbers you supply.

No set of mortgage tables that financial institutions use can supply all this flexibility conveniently. This is where the computer provides advantages if it is programmed to do so.

Another major advantage of this program over a standard program for printing out mortgage schedules is that it allows one to investigate alternatives before making the decision to commit

ADVANCE-INTERFACE ELECTRONIC INC.

INTEL C8087-3\$199.00 C8087-2\$449.00	TTLs SERIES 7400 74LS00 SERIES 74S00CALL!	800 SERIES 80C35\$ 9.00 8035L\$ 7.80 80C39\$ 9.80 8039\$ 8.20 8085A\$ 5.90 8085A-2\$ 14.60 8086\$ 21.50 8088\$ 19.00 8089A\$155.00 8155\$ 9.60 8156\$ 9.60 8202A\$ 49.50 8212\$ 3.10 8214\$ 4.40 8216\$ 2.90 8226\$ 7.50 8228\$ 8.50 8237A-5\$ 19.00 8243\$ 8.50 82C43\$ 8.80 INS8250A\$ 22.00 INS8250B\$ 22.00 8251A\$ 6.60 8253C-5\$ 7.80 8255A-5\$ 8.20 8257C-5\$ 8.30 8259C-5\$ 5.90 8279C-5\$ 8.50 8282\$ 8.80 8283\$ 6.50 8284A\$ 7.80 8286\$ 7.90 8287\$ 8.00 8288\$ 17.30 8289\$ 34.00 8741A\$ 32.00 8748\$ 33.00 8749\$ 36.00 8751A\$265.00 8755A\$ 85.00 NEC/MIT/INTEL	PC/XT CARDS *DISK CONT CARD ...\$119.00 *MONO GRAPHICS + PRINTER PORT CARD \$330.00 *300 BAUD MODEM CARD\$277.00 *512K RAM CARD (O-K)\$179.00 *512K RAM CARD (256K)\$473.00 *64K PRINTER BUFFER CARD\$295.00 *4 WAY I/O PLUS CARD\$235.00 *384K MULTIFUNCTION CARD (64K RAM)\$375.00 *12 BIT AD/DA CARD ..\$295.00 *5 IN 1 256K MULTIFUNCTION (O-K RAM)\$244.00 *5 IN 1 256K MULTIFUNCTION CARD (256K RAM)\$424 *COLOR GRAPHIC & PRINTER CARD\$299.00 *GAME I/O CARD\$ 98.00 *300-1200 SUPER MODEM CARD\$330.00 *FLOPPY DISK & PRINTER CARD\$255.00 *5 IN 1 MULTI I/O CARD\$365.00 TOP QUALITY 180 DAYS GUARANTEE!!!
EEPROM 2816A \$65 INTEL/SEEQ 2651A\$23.00 2661A\$23.00	CMOSs SERIES CD4000 MC14000 MM74C00 SERIES 74HC00CALL	DRIVER ICs ULN2001A 26LS29 ULN2002A 26LS30 ULN2003A 26LS31 ULN2004A 26LS32 ULN2005A 26LS33 ULN2064 ULN2065 ULN2066 ULN2067 ULN2068 ULN2069 ULN2074 ULN2075	D CONNECTORS 9P\$2.50 9S\$2.80 15P\$2.80 15S\$3.20 25P\$3.30 25S\$3.60 37P\$3.80 37S\$4.20 50P\$4.80 50S\$5.50 CARD EDGE CONNECTORS *0.1" pin spacing 10 x 2 to 50 x 2 contact solder-pins/W.W. pins *0.125" pin spacing 15 x 2 to 50 x 2 contact solder-pins/W.W. pins *0.156" pin spacing 6 x 2 to 43 x 2 contact solder- pins
RAMs 2016AP-10\$ 7.00 2114AP-12\$ 1.90 4116-15\$ 1.15 4164-12\$ 7.00 4164-15\$ 5.00 41256-15\$33.00 4416/81416\$ 8.50 MK4801A\$17.50 5514AP-12\$ 4.50 6116LP-15\$ 7.00 6264LP-15\$44.00	6502 SERIES 6502A\$6.20 6520A\$6.00 6522A\$6.20 6532\$9.80	800 SERIES 80C35\$ 9.00 8035L\$ 7.80 80C39\$ 9.80 8039\$ 8.20 8085A\$ 5.90 8085A-2\$ 14.60 8086\$ 21.50 8088\$ 19.00 8089A\$155.00 8155\$ 9.60 8156\$ 9.60 8202A\$ 49.50 8212\$ 3.10 8214\$ 4.40 8216\$ 2.90 8226\$ 7.50 8228\$ 8.50 8237A-5\$ 19.00 8243\$ 8.50 82C43\$ 8.80 INS8250A\$ 22.00 INS8250B\$ 22.00 8251A\$ 6.60 8253C-5\$ 7.80 8255A-5\$ 8.20 8257C-5\$ 8.30 8259C-5\$ 5.90 8279C-5\$ 8.50 8282\$ 8.80 8283\$ 6.50 8284A\$ 7.80 8286\$ 7.90 8287\$ 8.00 8288\$ 17.30 8289\$ 34.00 8741A\$ 32.00 8748\$ 33.00 8749\$ 36.00 8751A\$265.00 8755A\$ 85.00 NEC/MIT/INTEL	D CONNECTORS 9P\$2.50 9S\$2.80 15P\$2.80 15S\$3.20 25P\$3.30 25S\$3.60 37P\$3.80 37S\$4.20 50P\$4.80 50S\$5.50 CARD EDGE CONNECTORS *0.1" pin spacing 10 x 2 to 50 x 2 contact solder-pins/W.W. pins *0.125" pin spacing 15 x 2 to 50 x 2 contact solder-pins/W.W. pins *0.156" pin spacing 6 x 2 to 43 x 2 contact solder- pins
EPROMs 2716(3V)\$14.00 2716-450\$ 4.50 2716-300\$ 8.80 27C16-450\$24.00 2732-450\$ 6.30 2732A-250\$ 6.90 2532-450\$ 8.50 2764-250\$ 9.30 27C64-200\$24.00 27128-450\$18.50 27128-250\$19.50 27256-300\$88.00	280A SERIES CPU\$ 4.50 CTC\$ 5.20 DMA\$15.00 DART\$10.50 PIO\$ 5.20 SIO/0\$15.00 SIO/1\$15.00 SIO/2\$15.00 B-CPU\$12.50	DRIVER ICs ULN2001A 26LS29 ULN2002A 26LS30 ULN2003A 26LS31 ULN2004A 26LS32 ULN2005A 26LS33 ULN2064 ULN2065 ULN2066 ULN2067 ULN2068 ULN2069 ULN2074 ULN2075	CARD EDGE CONNECTORS *0.1" pin spacing 10 x 2 to 50 x 2 contact solder-pins/W.W. pins *0.125" pin spacing 15 x 2 to 50 x 2 contact solder-pins/W.W. pins *0.156" pin spacing 6 x 2 to 43 x 2 contact solder- pins
64K RAM SALE 4164-150nS HIT/TOS/NEC \$34/set of 9 1000 pcs and upCALL!!!	F.D. CONTROLLER LSI 1771 1791 1793 1795 1797 2791 2793 2795 2797 WD1691CALL!!! WD2143 WD9216PA-00 UPD765A/8272 P8271	DRIVER ICs ULN2001A 26LS29 ULN2002A 26LS30 ULN2003A 26LS31 ULN2004A 26LS32 ULN2005A 26LS33 ULN2064 ULN2065 ULN2066 ULN2067 ULN2068 ULN2069 ULN2074 ULN2075	CARD EDGE CONNECTORS *0.1" pin spacing 10 x 2 to 50 x 2 contact solder-pins/W.W. pins *0.125" pin spacing 15 x 2 to 50 x 2 contact solder-pins/W.W. pins *0.156" pin spacing 6 x 2 to 43 x 2 contact solder- pins
CLOCK CHIPS MSM5832RS\$13.00 MSM58167A\$19.50 MSM58174A\$19.50	PROGRAMMING SERVICE 2716-27512 27C16-27C256 2816/48016 8741A-8755A 62 Pin CONNECTOR for PX/XT\$2.30	DRIVER ICs ULN2001A 26LS29 ULN2002A 26LS30 ULN2003A 26LS31 ULN2004A 26LS32 ULN2005A 26LS33 ULN2064 ULN2065 ULN2066 ULN2067 ULN2068 ULN2069 ULN2074 ULN2075	CARD EDGE CONNECTORS *0.1" pin spacing 10 x 2 to 50 x 2 contact solder-pins/W.W. pins *0.125" pin spacing 15 x 2 to 50 x 2 contact solder-pins/W.W. pins *0.156" pin spacing 6 x 2 to 43 x 2 contact solder- pins
UARTs AY3-1015D AY5-1013ACALL!! IM6402	62 Pin CONNECTOR for PX/XT\$2.30 FLAT CABLES 10C\$0.30/ft 20C\$0.60 26C\$0.76 34C\$0.95 40C\$1.05 50C\$1.20		

* All prices and availabilities are subject to change without notice

*** * * Call us for quantity pricing & delivery information * * ***

Mail Orders add \$5.00 for shipping and handling. Ontario residents add 7% P.S.T. VISA, Mastercard, Money Order and Certified Cheque accepted.

ADVANCE-INTERFACE ELECTRONIC INC.

232A Queen St. West, 2nd floor, Suite 1, Toronto, Ontario M5V 1Z6

TELEX = 06-218660
FAX = 416-495-1214 (G2/G3)
TEL = 416-591-8433

The Mortgage Program

```

20 REM C=COMPOUNDS/YEAR:IR=INTEREST RATE:IX=INTEREST FACTOR:P=PRINCIPAL
   :PY=PAYMENT:T=TIME(YEARS TO PAYMENTS):IR/100=INTEREST AS A DECIMAL:M
   SP=PAYMENTS TO PRINTOUT:DY=DELAY:MC=PAYMENT COUNTER
30 REM IA=CURRENT INTEREST:PA=PAYMENT ON PRINCIPAL:BA=BALANCE:NP=NO.
   PAYMENTS PER YEAR
40 REM TI=CUMULATIVE INTEREST:TP=CUMULATIVE PRINCIPAL:FP=FINAL PAYMENT
   (USED ONLY WHERE MSP<T)
50 CLEAR : HOME
60 HTAB 10: VTAB (5): PRINT "PLEASE ANSWER THE PROMPTS,"
70 HTAB 10: PRINT "TO SET UP LOAN SCHEDULE."
80 PRINT : PRINT "PRINCIPAL?";: HTAB 20: INPUT "$";P
90 PRINT : PRINT "RATE, %/ANNUUM?";: HTAB 20: INPUT "";IR
100 IR = IR / 100:C = 2:NP = 12
110 PRINT : PRINT "WILL PAYMENTS BE MONTHLY? N/Y": GET X$: IF X$ = "Y" THEN
   GOTO 130
120 INPUT "THEN HOW MANY PAYMENTS PER YEAR? ";NP
130 PRINT : PRINT "2 COMPOUNDINGS / YEAR? N/Y": GET X$: IF X$ = "Y" THEN
   GOTO 150
140 PRINT : INPUT "THEN HOW MANY COMPOUNDINGS / YEAR? ";C
150 PRINT : PRINT : PRINT "IS TERM IN FULL YEARS? N/Y": GET X$: IF X$ =
   "Y" THEN GOTO 170
160 PRINT : INPUT "THEN ENTER THE TOTAL NUMBER OF PAYMENTS TO COMPLETE T
   ERM ";T: GOTO 190
170 PRINT : PRINT "FULL TERM IN YEARS ";: HTAB 25: INPUT T:T = T * NP
180 REM CALCULATE INTEREST FACTOR
190 IX = ((1 + IR / C) ^ (C / NP) - 1)
200 REM PAYMENT FORMULA:ROUND UP
210 PY = (P * IX) / (1 - (1 + IX) ^ (- T)):PY = INT (PY * 100 + 1) / 10
   0
220 Z1 = PY: GOSUB 750
230 HOME
240 VTAB 5: FLASH : PRINT "PAYMENTS WILL BE $"Z1$: NORMAL : PRINT
250 PRINT "HOW MANY PAYMENTS SHOULD SCHEDULE BE": PRINT "PRINTED? (PRES
   S <0> THEN <RETURN> TO"
260 PRINT "REVISE DATA OR QUIT BEFORE PRINTING)": INPUT MSP
270 IF MSP < = 0 THEN GOTO 400
280 IF MSP < = T THEN GOTO 310
290 PRINT : PRINT "YOU CANNOT EXCEED THE TERM OF THE LOAN"
300 PRINT "PRESS <RETURN> TO REENTER": GET F$: IF F$ = CHR$ (13) THEN
   GOTO 230
310 D$ = CHR$ (4)
320 PRINT : PRINT D$;"PR#1": PRINT
330 BA = P:MC = 0:TI = 0:TP = 0
340 GOSUB 440: GOSUB 450: GOSUB 440: GOSUB 500
350 FOR MC = 1 TO MSP: GOSUB 540: NEXT :
360 GOSUB 650
370 PRINT D$;"PR#0"
380 HOME
390 PRINT "WOULD YOU LIKE ANOTHER COPY OF": PRINT TAB( 4);"THE SAME SCH
   EDULE Y/N?";: GET X$: IF X$ = "Y" THEN GOTO 320
400 HOME : VTAB 10: PRINT "PREPARE ANOTHER LOAN? N/Y": GET X$: IF X$ =
   "N" THEN GOTO 420
410 GOTO 50
420 HOME : VTAB 10: FLASH : PRINT "SIGNING OFF THEN.....": FOR DY = 1 TO
   2000: NEXT : NORMAL : HOME
430 END
440 FOR X = 1 TO 70: PRINT "": NEXT : RETURN
450 PRINT : PRINT CHR$ (13); TAB( 20);"PRINCIPAL $";P
460 PRINT "AMORTIZED OVER ";T;" PAYMENTS @ ";IR * 100;" % COMPOUNDED ";C
   ;" TIMES ANNUALLY"
470 PRINT "INTEREST FACTOR ";IX; TAB( 5);"PAYMENTS ARE $";PY;" PER ";12 /
   NP;" MONTHS"
480 PRINT CHR$ (13)
490 RETURN
500 PRINT : PRINT CHR$ (13)"DATE PAYMENT"; TAB( 10);"INTEREST"; TAB(
   12)"PRINCIPAL"; TAB( 10);"BALANCE"
510 PRINT "_____" ; TAB( 10);"_____" ; TAB( 12);"_____" ; TAB(
   10);"_____"
520 RETURN
530 REM PAYMENT SCHEDULE CALCULATIONS
540 IA = INT ((BA * IX * 100) + .5) / 100
550 PA = PY - IA:BA = BA - PA
560 IF MC = T THEN PA = (PA + BA):BA = 0
570 TI = (TI + IA):TP = (TP + PA)
580 REM SPACING PAYMENT SCHEDULE
590 A1 = MC:X = 14: GOSUB 790
600 Z1 = IA:X = 16: GOSUB 730
610 Z1 = PA:X = 18: GOSUB 730
620 Z1 = BA:X = 18: GOSUB 730
630 PRINT : REM FORCE CARRIAGE RETURN

```


TOSHIBA

Introduces

2 Hi-Speed Bilingual Printers



Make the best possible impression on the people who read the results you get on your IBM PC** (XT or new AT models) or any other micro. Check the specs on this new Toshiba printer.

THE NEW TOSHIBA P1351 PRINTER

Two Speeds

Toshiba delivers performance, with unique high density 24 pin dot-matrix print head. It lets you print crisp, clear letter copy at 100 cps., draft copy at 192 cps. And with the software-selectable downloading fonts (optional), you get to pick from a variety of type styles.

Condensed Print

Toshiba's deluxe P1351 printer features condensed print, which enables the end user to print 17 characters per inch.

Great Graphics

The P1351 has more stuff to show. Like 180x180 dots-per-inch high-resolution graphics, 132 column-width platen (great for spreadsheets and Lotus™ 1-2-3™ data processing and graphics), Qume SPRINT 5™ emulation, and a choice of either a forms tractor or automatic sheet feeder.

THE NEW TOSHIBA P1340 PRINTER

Versatile

For exceptional value, the new P1340 gives you high-density 24-pin dot-matrix print head, 180x180 dots-per-inch graphics resolution, and the Qume SPRINT 5™ emulation. In addition to true proportional spacing and a built-in forms tractor.

So the choice is yours. Whichever Toshiba printer you choose, you know you're putting on the best show possible.

For more information call . .

Toronto: (416) 475-9434, Montreal: (514)
332-4794, Ottawa: (613) 725-3626,
Vancouver: (604) 736-2858

DEALER INQUIRIES INVITED.

**IBM PC to P1340 and P1351 graphics utilize PaperScreen and the IBM PC with colour/graphics adapter. IBM PC is a Trademark of International Business Machines. Lotus™ and 1-2-3™ are Trademarks of Lotus Development Corporation. SPRINT 5™ is a Trademark of Qume Corporation. ©1984 Toshiba America, Inc.

GENAMATION INC.

351 Steelcase Road West, Markham, Ontario L3R 3W1 Telephone: (416) 475-9434
Montreal • Ottawa • Toronto • Vancouver

Circle No. 21 on Reader Service Card

The Mortgage Program

```

640 RETURN
650 IF MSP < T THEN GOTO 680
660 FP = (IA + PA):Z1 = FP: GOSUB 750
670 PRINT : PRINT CHR$(13);"FINAL PAYMENT IS $";Z1$
680 Z1 = TP: GOSUB 750
690 PRINT CHR$(13); CHR$(13); HTAB 10: PRINT "TOTAL PRINCIPAL PAID:
    $";Z1$
700 Z1 = TI: GOSUB 750
710 HTAB 10: PRINT "TOTAL INTEREST PAID: $"; LEFT$(Z1$,J + 2): RETURN
720 REM SPACE AND PRINT INT, PRIN, BAL
730 GOSUB 750: PRINT TAB(X - J)Z1$:: RETURN
740 REM ENSURES ONE DIGIT BEYOND SECOND DECIMAL:ROUNDS TO CENTS
750 Z1$ = STR$(Z1): FOR J = 1 TO LEN(Z1$): IF MID$(Z1$,J,1) < > ".
    " THEN NEXT J
760 IF (J + 2) > = LEN(Z1$) THEN Z1 = Z1 + .001
765 Z1$ = STR$(Z1):Z1$ = LEFT$(Z1$, (J + 2))
770 RETURN
780 REM NUMERIC TO STRING VALUE FOR YEAR AND MONTH
790 A1$ = STR$(A1):K = LEN(A1$)
800 REM SPACE AND PRINT (DATE) AND PAYMENT NUMBER
810 PRINT TAB(X - K)A1$:: RETURN

```

the results to hard copy. One may enter all the variables I've noted. The program then branches to tell the operator what the payments will be. The operator then has the option to print out the schedule for as long a time period as is desired, or to revise data input before printing. Thus the program permits one to explore before deciding to print out a schedule.

After printing a schedule, duplicate copies of the same schedule may be produced, or different schedules may be set up, all without restarting the program.

The mathematical advantages of the program are apparent when one examines a sample printed schedule. The payments are rounded up to the whole cent, rather than to the nearest cent. Lest one think that this favours the lender let me hasten to add that this means that the last payment of a schedule that runs full term

will always be a little smaller and that there will be no surprising extra balance to pay at the end.

The interest payments and principal payments are totalled to the end of the print out time, thus satisfying the requirement for full disclosure of information.

The difficult part of preparing this schedule was in formatting the output. I have worked on this to produce what I believe is a well balanced very readable display. The system I used was an Apple IIe with an Epson MX 80 printer. If you use any other hardware you may experience some problems unless you are aware of the adaptations that must be made to suit your configuration. However no tricky programming techniques are used. Standard BASIC is used throughout, so there should be no serious problems to adapting this code to run in another environment.

Inside the program...

Because the working of a mortgage program can be a bit complex even if you have it spread out before you, here's a look at the functional elements of the code.

Lines beginning with REM may be omitted with no loss to the program if you wish to save memory space. Please do not apply that to line 10.

Where a space has been left at the beginning or end of a bracket make sure to include it.

20 to 40	Identify all the variables used
50	Sets cursor at home position and clears the memory.
60 to 70	Prompts for input data.
180 to 190	Calculates the interest factor.
200 to 220	Calculates the payment value and rounds it upward.
230 to 240	Homes the cursor and flashes payments.
250 to 300	Provides the option to print the schedule for a specified number of payments or to revise the data.
310 to 320	Turn on printer.
330	Ensures that the variables that count or total are set to zero and that the balance starts at the principal amount.
340, 440 to 490	Sets up the header containing input data.
500 to 520	Sets up the headings for tabular data.

350	Counts the payments.
530 to 550	Calculates and rounds off the schedule data payment by payment.
560	Cleans up the final principal and balance payments.
570	Totals the interest and principal payments.
580 to 640	
720 to 810	Spaces payment schedule so columns are right justified.
740 to 770	Ensures that all the money data will contain two digits after the decimal, rounded properly.
360, 650 to 670	Prints out the final payment if printed schedule runs full term.
680 to 710	Formats and prints the total principal and interest paid.
370	Turns the printer off.
380 to 390	Allows one to choose to print another copy of the same schedule and the program picks up from line 320.
400 to 410	Allows one to choose to prepare a different loan, and the program starts over at line 50.
420 to 430	Flashes sign off to end the program and return control to the user.

When you are ready to run the program, make sure your printer is on and the paper is in position. If you have no printer, omit lines 310, 320 and 370.

CN!

Product Mart

Where Buyers Find Sellers



1054 Bank Street
Ottawa, Ontario
K1S 3X2

Tel: 613-230-2854.

For all your ATARI hardware and software requirements. Orders accepted on phone by major credit cards or by mail by certified cheque.

"PROJECT GENESIS" (64K CoCo) \$24.95. Now shipping! UPS, cables, software, ribbon re-inkers. Apple IIc or CoCo parallel printer interface \$99.95. Catalog \$1.00. **BETTER SOFTWARE**, Dept. ETI (or CN!) Box 2203, Charlottetown, P.E.I. C1A 8B9.

PRINTER and Plotter Manual and Disk Drive Manual. Both for \$14.95, or send self addressed stamped envelope for free 8 page catalogue of books and kits to **SIMPLIFIED TECHNOLOGIES**, 214 King St., E. Hamilton, Ontario L8N 1B5

SOFTWARE for all leading computers at discount prices. Tell us your computer model and receive our free catalog. **COMP-CAN**, 1477 Hunt St., Sarnia, Ont. N7S 3M8.

Advertising in the **Product Mart** section allows you to reach thousands of Canadian readers nationwide effectively and economically. Please contact Dierdre Whitehead, Advertising Service Manager, (416) 423-3262, for further details on the various sizes and styles available.

WHAT DO YOU DO?

Send us your typewritten or clearly printed words, your permanent address and telephone number and your payment (no cash please). Make your cheque or money order payable to Moorshead Publications. We're at Suite 601, 25 Overlea Blvd., Toronto, Ontario, M4H 1B1.

WHAT DO WE DO?

We typeset your words (and put the first word and your company name in **BOLD** capital letters). Your advertisement will appear in the first available issue.

DISKETTE CLEARANCE!! 5-1/4" SSDD generics \$15.95, 5-1/4" BASF-3M SSDD/DSDD \$22.95/\$28.95, 3-1/2" BASF Macintosh \$59.95. These are real bargain prices! **KOMPUTECH**, Box 3139, Picton, Ontario (613) 476-7523. 100% satisfaction guaranteed! Free Cat! Add \$1.50 shipping.

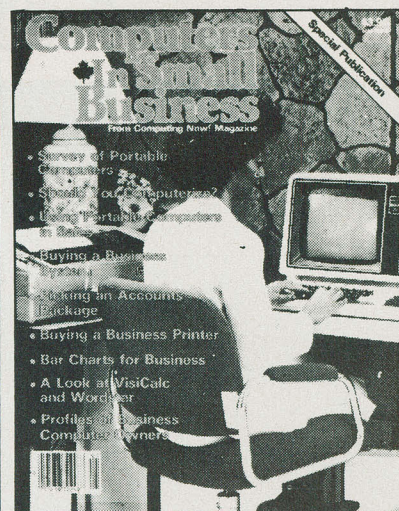
MUSIC SYNTHESIZER & accessories for your Apple — digital oscillator, interface card; hardware & software compatible with Soundchaser & alphaSyntauri systems. 61N keyboards from \$349. Write for list. Dealer inquiries invited. **CLASSIC ORGAN CO.**, 300-12 Don Park Road, Markham, Ont. L3R 3A1 (416) 475-1263.

TS2068 USERS. Easily interchange from TS2068 to U.K. Spectrum and access hundreds of U.K. Spectrum software titles. Write for information and latest **SPECTRUM, SOFTWARE** brochure to **E. McGhee**, No. 150 10127 121 Street, Edmonton, Alberta.

TURBO PASCAL VERSION 2.0 AND SIDEKICK. Authorized Borland Dealer — Specify Computer — Each Only \$69.95 + \$5.00 for Special Delivery — **VISA/MC OK** — **VECTOR COMPUTER SERVICES**, 32 Falconer Terrace N.E., Calgary, Alberta, T3J 1W4, (403) 280-4185.

SAVE \$\$\$ on SOFTWARE BY DIRECT MAIL! Apple, Atari, Commodore-64, VIC-20, IBM & more. Choose from Flight Simulation, Trivia, Games, Home/Business, Educational titles. Send for **FREE Catalogue**, specify your computer type. **THE SOFT WAREHOUSE**, Dept. 12, Box 1983, Winnipeg, Man. R3C 3R3.

Computers In Small Business



Small companies across Canada are hungry for knowledge about the microcomputer revolution. Many of them believe that they alone are ignorant about what is going on and what equipment is available.

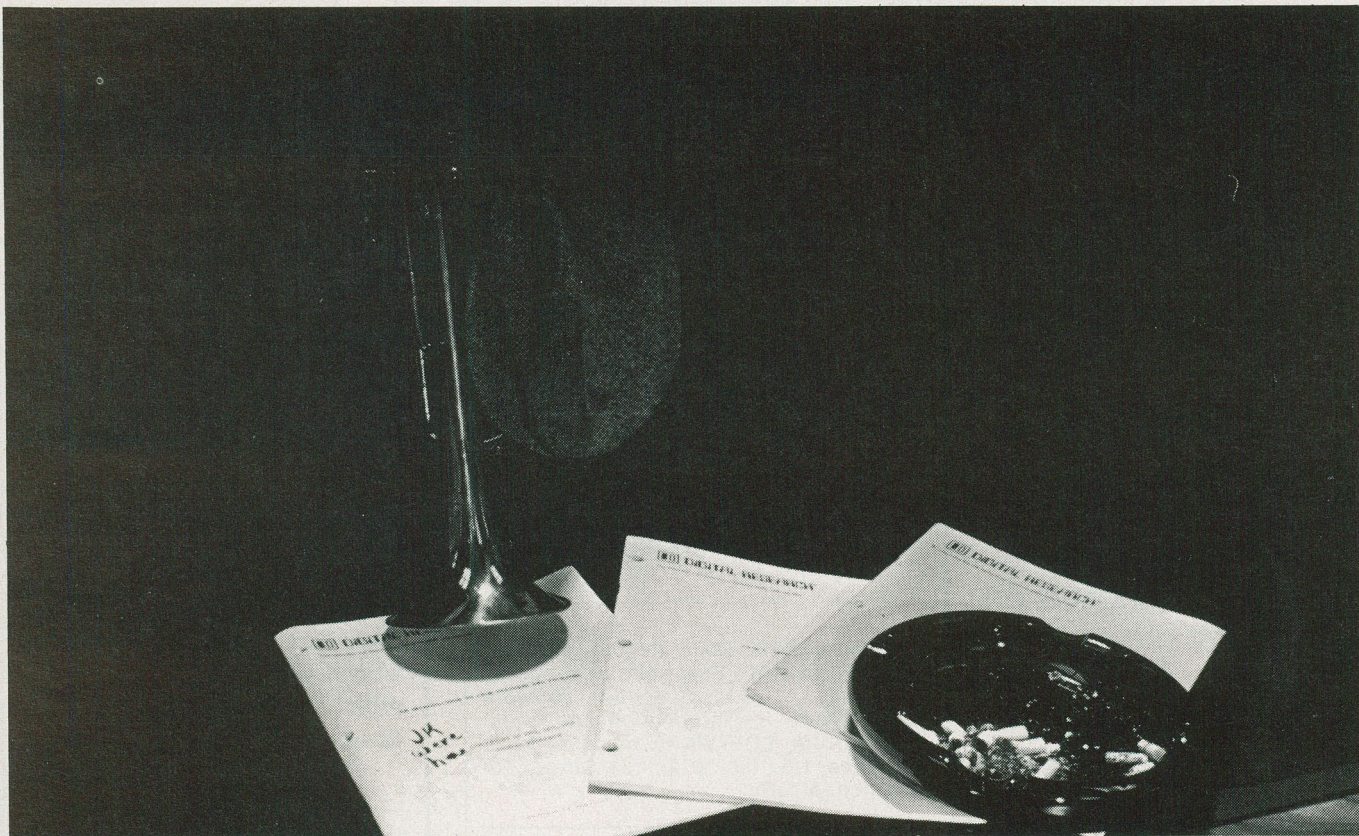
This Special publication is addressed exclusively to this market. The articles comprise reprints of the very best material already published in *Computing Now!* magazine together with several specially commissioned features to form a well balanced publication. We believe this Special is of real use to the hundreds of thousands of small companies on the verge of buying a microcomputer.

First Published March 1984

\$4.00 plus \$1.00 postage and handling For a copy call (416) 423-3262 or write:

Moorshead Publications
25 Overlea Boulevard,
Suite 601,
Toronto, Ontario, M4H 1B1

BeatNix for CP/M



There are a lot of good things about CP/M... but it lacks excitement. Every time you turn it on it does the same old prompt, gives you the same old BDOS errors on drives you haven't got. You probably need BeatNix, the operating system you write yourself.

by Steve Rimmer

After a while, as the vines start growing up your legs and overwhelming your computer table, you'll find that you can get quite comfortable using CP/M... in very much the same way that South American generals get comfortable in front of a firing squad, I think. While you may become familiar with this interesting bit of antiquity, few souls ever really grow to like it.

There are, of course, decidedly more interesting alternatives. Perhaps the most reclusive of these is BeatNix, which, despite its obviously splendid human engineering and unfathomable flexibility is almost unheard of among most computer users. This may well be because of the relatively low profile which it has maintained in the world of basement level code, or, even more possibly, because I just made it up the other day.

The BeatNix operating system, or, more properly, command processor, is a replacement for the CP/M CCP, in much the same way as is ZCPR2, which we looked at in the January 1985 edition of Computing Now!. Unlike ZCPR2, however, BeatNix is a fairly simple program which can be easily understood... and more to the point, modified... by most users. It assembles with the simplest of tools and can be got going without too much trouble.

The best part about BeatNix, however, is its potential for be-

ing strange. While ZCPR2 attempts to emulate and enhance the CP/M environment, BeatNix creates a working rapport with its users unlike that of any other computer operating system. You can decide just how obtuse you want the syntax of it to be.

Eat To The Beat

If you were to look at a map of CP/M you would see the following stuff. Starting with location zero, there would be a JMP instruction to the warm boot vector of the system BIOS. Following this there is the IOBYTE, a set of flags which the BIOS is supposed to use to tell it how to handle the console and the system ports. Next we have the BDOS jump vector, the system RST vectors... these are never used in programs, except for this one... and then some buffers.

The transient program area starts at 100H and runs up until the start of the CCP. This is where programs go to do their things. The start of the CCP can be located by noting that CCPs always start 1600H below the BIOS. The BIOS starts three bytes below the warm boot vector and, as we can locate this from the JMP instruction down at location zero we can... through a fairly convoluted process... find the start of the CCP.

The CCP, or console command processor, is the part of CP/M which talks to you. What, you mean your computer *doesn't* talk to you... hmmm, maybe you have the wrong CCP.

Returning to sea level for a moment, the CCP has the responsibility of printing the command prompt on the screen, accepting what you type and making sense of it. This includes doing the built in commands, such as DIR and TYPE in the case of CP/M, and running the transient commands which you have on your disks. This, in turn, involves some low level housekeeping activities and other mundane tasks.

Unlike your BIOS, which was written specifically for your computer, the CCP is essentially the same code for all implementations of CP/M 2.2. The only difference amongst stock CCPs is where they're located, which is usually a factor of the amount of RAM in the system and the size of the BIOS.

Because we know what the CCP has to do it's eminently practical to write a new CCP. Changing the CCP allows one to make it behave the way one wants it to, rather than the way someone thought computers should behave in the late seventies. One could, for example, have a menu driven CCP, or one with different built in commands.

The only limitation to all of this is that the CCP must fit into two K of space, 0800H bytes, as this is all the room CP/M allows for it. Now, you can do a lot in this space. To begin with, you can eliminate those commands you don't need. This will free up quite a bit of room. More advanced CCP replacements are usually written in Z80 code, rather than 8080, as this allows for relative jumps, string manipulations and other tight instructions unique to the Z80. This, of course, is a drag if you have an older computer which uses an 8080 or a newer one with an 8085. It also entails the ownership of either a Z80 compatible assembler, such as M80, or a macro assembler like MAC and Z80.LIB to fake the additional instructions.

The BeatNix CCP replacement isn't anywhere near this slick. Based on the premise that a little bit of weird code is a lot more interesting than a whole pile of tight bytes, it fits into the two K space with ease. If you elect to implement BeatNix and subsequently modify it you might want to tighten it up to allow for breathing room. However, I have sought to keep this version small and manageable.

If you look at it you should be able to understand what a CCP actually does.

All That Jazz

Unlike most other programs, the CCP doesn't assemble into a COM file because it doesn't load up into the transient program area to run. Rather, the CCP code is merged into the system, stuck on the disk and put in high memory the next time the computer is booted.

The usual process for doing this is to assemble the code, producing a HEX file. You would create a system image by doing

A>SYSGEN

Source drive (or RETURN to skip):A

Destination drive (or RETURN to reboot):

A>SAVE 40 CPM.COM

This gets the system from drive A, placing it at 0900H in memory, which is usually just above the SYSGEN program itself. The SAVE command then takes this image and creates a file with it. You may have to grab more than forty sectors... your user's manual should speak regarding this subject.

The next bit of the process is somewhat tricky, in that it varies from computer to computer. The HEX file of the CCP program

must be merged into the image such that it lands exactly on top of the old CCP. However, the CCP is now down in low memory somewhere just above 0900H. The HEX file wants to go live where the CCP is supposed to be, 1600H bytes below the BIOS up at the top of RAM.

The way around this is to read the CCP into the SYSGEN image with an offset. This is just a value which is added to the location of every byte in the HEX file so that it winds up somewhere other than where it wants to go. In this case, we'll pick an offset so large that when it's added to the proper location of the CCP it will wrap clear around and start at location zero again. Thus, the new CCP will turn up in low memory, where we want it.

In order to figure the offset we must know where in memory the CCP really lives, which, as you'll see in a moment, is also necessary for the successful assembly of the BeatNix code. This is fairly easy to find with DDT. Having run DDT, do an L0 command, which will disassemble the jump instruction at location zero. Take the operand of this instruction, which might be, for example E603H. The low order byte is always 03. Subtract 1600 from this, ignoring the low byte. You can use DDT to do this, with the command HE600,1600. The answer, in this case, is D000, which is where the CCP lives.

The other bit of data you'll need is the location of the CCP in your SYSGEN image. This is usually at 0980H, but not always. The CCP starts with two jump instructions followed by a Digital Research copyright notice. You can, as such, start searching with DDT until you find it.

You can now calculate the offset with the H command, doing, in this case, HD000,0980. The offset in this case is 3980.

The moment is now upon us. To inhale the new CCP into the SYSGEN image you would, in this case, do

A>DDT CPM.COM
-IBEATNIX.HEX
-R3980

Apple BeatNix

Getting BeatNix up on the Apple II + under CP/M takes a bit of doing because there is no SYSGEN utility provided by Microsoft. You *can* do it, however, provided you have CPM56 and are happy using a fifty-six K system.

The CCP for the Apple starts at C400, which is the value you should use for the CCP equate in the code... where I have D000H in the example. Assemble BeatNix with DEBUG set FALSE, which should leave you with a HEX file.

Now DDT CPM56.COM. If you look at 0E00H you should find the CCP. Do

IBEATNIX.HEX
R4A00

and look at 0E00H again. The CCP should now hold the literals and stuff from BeatNix. Hit a control C and type

SAVE 47 BEAT56.COM

Run BEAT56 as if it were CPM56... which it more or less is. When you are finished you'll have a working bootable BeatNix system on whatever disk you've initialized with BEAT56.

Make sure you don't beat up on your master... always hack on copies.

BeatNix for CP/M

If you now look at 0980H you should see the new CCP in place. You can now make this image permanent by leaving DDT and running SYSGEN, skipping the source disk prompt so that SYSGEN will use the modified image that's already lurking about in RAM. Actually, since you created the image with SYSGEN you'll probably find that SYSGEN is already present in your image below the CCP. As such, you can usually run it without leaving DDT by typing G0100.

Rebooting the computer... or, in fact, just typing a control C... will make the new CCP active.

The only other consideration in all this is for Apple users, inasmuch as Apple CP/M doesn't come with SYSGEN. There is a way around this, too. Check out the appropriate box elsewhere in this article.

Now For The Strange Bits

Having seen how the CCP is integrated into the system it should be a bit easier to understand exactly how this whole party comes down. What remains is understanding what the thing does, and, more to the point, how.

Any code which lives at the location which the system regards as the start of the CCP will run when the BIOS finishes a warm boot. The standard form of a CP/M CCP, however, has it start with two jump instructions and a CP/M string buffer. This latter phenomenon consists of a byte which represents the length of the buffer, followed by a byte in which the length of the string typed into the buffer will be stored, followed by the buffer itself. This is the buffer used by the CCP when you type in commands.

The BeatNix CCP starts at ENTRY. The ORG value is determined with DDT, as we checked out above. While we don't have to preserve the structure of the CP/M CCP in BeatNix for it to work, there are some programs which will locate the CCP and do things to the buffer portion of it. It is a good trip, as such, to make sure that they'll find familiar ground.

The BeatNix code, to begin with, has a number of peculiarities. These are largely deliberate... operating systems have never been satisfactorily weird. You can enhance or eliminate these things as you see fit.

To begin with, the built in commands of BeatNix are few. I didn't want the code to run for miles and, as such, I've made the whole affair fairly simple. There is room to add quite a bit more stuff, especially if you take out the HELP function.

The commands I've chosen for BeatNix are lifted from Unix, for no particularly good reason. Drive A under CP/M is drive one under BeatNix, although you can make it drive A again by changing the value of DISKOFF. The command to type files is CAT, and getting a disk directory involves FILES. The DRIVE command... yes, you've guessed it... changes drives. In the interest of simplicity I've ignored the user areas. HELP prints a one page screen of instructions. The BeatNix prompt is

[1]

You can actually make BeatNix behave just like CP/M if you feel you must, but it's so much more funky to do it this way.

In fact, despite the sort of esoteric nature of BeatNix, the code that comprises it is pretty top down. Looking at it from the start on in, the two jump instructions are where they are so that other software can locate the CCP and execute a warm boot either with or without the processing of the command in the console buffer. The command that I've installed in it here is CAT HELLO, which types the file HELLO on drive one. You can change this, or remove it entirely by simply making the CHRCNT byte zero.

You'll note that the vector that doesn't run the command in the buffer simply nulls this byte.

The command processor itself consists of two parts. The first bit gets the command in from your keyboard through the function ten BDOS call. This is how the real CCP does it, so the command line will behave the same as it does under CP/M. The second half decides what to do about the command.

This part could be a lot more sophisticated, but, once again, it would have involved everyone typing in a lot of code.

In deciding what to make of a command BeatNix begins by comparing it to the ones it knows about, to wit, the internal command names. It uses ILCOMP for this, an internal routine which compares the string pointed to by the DE register to the one immediately after the call. There's a more complete explanation of ILCOMP in the PC Utility Blues article in the February 1985 edition of Computing Now!

Both ILCOMP, and the in line print utility ILPRT, which we've encountered before, work a bit differently under BeatNix than they normally do in that the terminator of a string for either of them is any character with its high bit set. Another way of saying this is that to signify the end of a string you take the last character and add 80H to it.

This approach is useful in things like a CCP because ordinary terminator characters waste space. Admittedly, the verbose help page wastes space too.

If one of the transient strings matches the input string the program will jump to the appropriate routine and execute the code it finds there. The internal commands are pretty straight forward, and probably don't require much explanation.

If none of the internals match the next trip is to see if there's a command on the disk with the name that's been typed in. The first thing to do is to create a file control block which holds the command name and the extension COM to attempt to open the file.

The running of a COM file is actually pretty simple. Assuming that there actually is one going under the name that has been typed into the buffer the system will load it into memory just like a text file, starting at 0100H, and then call the transient program area, which is the entry point for all COM files.

If the program ends with a RET instruction it will return directly to BeatNix, finding itself at the JMP instruction just before the help page. This, in turn, will pop it back to the command line. If it ends with a warm boot jump the BIOS will send it back to the first JMP in the CCP, restarting the whole circus.

```
; BEATBEATBEATBETBEATBEATBEATBEATBEATBEATBEATBEATBEATBEATBEAT
;
;      BeatNix Operating System
;      a small ccp replacement for heads
;      that can't get into zcpr2
;
;      Copyright (c) 1985 Steve Rimmer
;
;      'Yonder goes the luminous wombat. Pray,
;      follow his beat into the light...'
;
; BEATBEATBEATBETBEATBEATBEATBEATBEATBEATBEATBEATBEATBEATBEAT
TRUE    EQU    0FFFFH
FALSE   EQU    0000H

VERS    EQU    6           ;VERSION
SUBVERS EQU    9           ;SUBVERSION

DEBUG   EQU    FALSE      ;TRUE FOR MEDDLING

CCP      IF      DEBUG
          EQU    0100H      ;MAKE CCP START AT TPA
          ELSE
          EQU    0D000H     ;CCP STARTS HERE
          ENDIF
```



```

SDEEP EQU 24 ;DEPTH OF SCREEN
SWIDE EQU 80 ;WIDTH OF SCREEN
BUFLEN EQU 80H ;MAXIMUM BUFFER LENGTH
BDOS EQU 0005H ;THE BDOS ENTRY
DMA EQU 0080H ;DMA BUFFER
FCB EQU 005CH ;THE FILE CONTROL BLOCK
CONTAIL EQU 0080H ;COMMAND TAIL

TPA IF DEBUG
EQU 8000H ;WHERE TPA STARTS
ELSE
TPA EQU 0100H ;WHERE TPA STARTS
ENDIF

MAXDSK EQU 2 ;HIGHEST DRIVE SUPPORTED
WILDCRD EQU '*' ;WILD CARD CHARACTER
CR EQU 13
LF EQU 10
EOF EQU 26 ;END OF FILE CHARACTER
BRK EQU 3 ;CONTROL C TO BREAK

DISKSP EQU ':' ;DISK SPECIFIER CHARACTER
DISKOFF EQU '0' ;DISK SPECIFIER OFFSET

ENTRY: ORG CCP
JMP CPR ;EXECUTE COMMAND IN BUFFER
JMP CPR1 ;DON'T DO COMMAND IN BUFFER

BUFSIZ: DB BUFLN ;MAXIMUM BUFFER LENGTH
CHRCNT: DB 0 ;NUMBER OF VALID CHARS IN COMMAND LINE
CMDLIN: DB 'CAT HELLO' ;DEFAULT (COLD BOOT) COMMAND
DB 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
CRIGHT DB 'BeatNix',VERS+'0',SUBVERS+'0'
DB ' Copyright 1985 (c) Steve Rimmer'
CRTEND DB 0
DS BUFLN-($-CMDLIN)+1 ;TOTAL IS 'BUFLN' BYTES
LINCNT DB 0 ;PAGING BUFFER
COM DB 'COM' ;EXECUTABLE FILE EXTENSION

```

```

;
CPR1: XRA A ;SET END OF COMMAND LINE
;SO NO DEFAULT COMMAND
STA CMDLIN ;FIRST CHAR OF BUFFER
CPR: LXI SP,STACK ;RESET STACK
CALL SETDMA ;POINT DMA TO DMA BUFFER

LOGIN MVI C,14 ! MVI E,0 ! CALL BDOS ;LOG IN DRIVE A
MVI C,32 ! MVI E,0 ! CALL BDOS ;USER 0
MVI C,13 ! CALL BDOS ;REST DISK SYSTEM
JMP PROCMD ;JUMP INTO PARSER

GETLIN: ;SHOW PROMPT AND GET A COMMAND
CALL DRVCODE ;GET THE CURRENT DRIVE
MOV A,C ;INTO A
STA DRVPR ;PUT IT IN THE STRING
CALL ILPRT ;AND SHOW THE PROMPT
DB CR,LF,'['
DRVPR DB ']','+80H

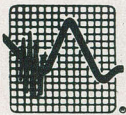
MVI B,BUFLN ! MVI A,' ' ! LXI H,CMDLIN
CALL FILL ;CLEAR OUT BUFFER

PROCMD MVI C,10 ! LXI D,BUFSIZ ! CALL BDOS ;GET STRING INTO BUFFER
LDA CHRCNT ;HOW MANY CHARACTERS ENTERED?
CPI 0 ! JZ GETLIN ;IF ZERO HAVE AT IT AGAIN

; +++ NOW PARSE COMMAND +++

LXI D,CMDLIN ! CALL ILCOMP
DB 'FILE','S'+80H ;IS IT DIRECTORY COMMAND?
JZ DIR ;IF SO, DO IT
CALL ILCOMP
DB 'CA','T'+80H ;IS IT TYPE COMMAND
JZ TYPE ;IF SO, DO IT
CALL ILCOMP
DB 'HEL','P'+80H ;IS IT HELP COMMAND?
JZ HELP ;IF SO, DO IT

```



CAN YOU AFFORD NOT TO PROTECT YOUR COMPUTER?



POWER-PROBLEMS
are estimated to cause up to
90% of all computer and
word processor malfunctions

Dirty Power
constitutes the greatest
single threat to the
operation of your system

MOST
users do not realize their
computer is under constant
attack by **dirty power**

**COMPUTER
PROBLEMS??**

THE TYCOR® AC POWER LINE FILTER
is the most effective method
of protecting your investment

(MANUFACTURED BY TYCOR®, CALGARY, ALBERTA)

NATIONAL OUTLETS

Canlab
Computerland
Data Terminal Mart
Future Electronics
Olivetti Canada

Sweda
TRW
Wang 1-800-268-7830
Wesco
Xerox

REGIONAL OUTLETS

Calgary — Powerco
Montreal — Franklin Electrical
Ottawa — Finlay Moylan & Associates
Toronto — Scarsdale — Salex
Vancouver — Power Protection Systems Group

BeatNix for CP/M

```

CALL ILCOMP
DB 'DRIV','E'+80H ;IS IT CHANGE DIRECTORY?
JZ CDIR ;IF SO, DO IT
IF DEBUG
CALL ILCOMP
DB 'MO','N'+80H ;IS IT MON?
JZ RESET ;IF SO, DO IT
ENDIF
JMP TRANS ;TRY TRANSIENT COMMAND

;IF BAD TRANSIENT, COMES BACK HERE
UNCOOL CALL CRLF ! LXI H,CHRCNT ! MOV B,M ! INX H
CALL PRINT ! CALL ILPRT
DB ' is an uncool command','.'+80H
JMP GETLIN ;AND GET NEW COMMAND

;----
;---- UTILITIES
;----
IF DEBUG
RESET: ;DO DDT RESET
CALL CRLF ;SHOW NEW LINE
RST 7 ;BOF INTO DDT (NEAT, WHAT....)
ENDIF

LOAD: ;LOAD COM FILE INTO TPA
CALL OPEN ! CPI OFFH ! RZ ! LXI D,TPA ;OPEN FILE
LOADL PUSH D ! MVI C,26 ! CALL BDOS ;SET DMA
CALL READ ! POP D ! CPI 0 ! JNZ LOADN ;READ SECTOR
XCHG ! LXI D,128 ! DAD D ! XCHG ;ADD 1 SECTOR
JMP LOADL ;AND GET ANOTHER
LOADN CALL CLOSE ! XRA A ! RET

CRLF: CALL ILPRT ;SHOW NEW LINE ON TUBE
DB CR,LF+80H
RET

CONOUT: ;SEND A TO TUBE
MVI C,2 ! MOV E,A
PUSH H ! PUSH D ! PUSH B ! CALL BDOS
POP B ! POP D ! POP H ! RET

PAUSE: ;PAUSE FOR A KEY BASH
CALL ILPRT
DB CR,LF,[' More ',' ']+80H
WAIT CALL CONSTAT ! CPI 0 ! JZ WAIT
MVI A,CR ! CALL CONOUT ! CALL CONIN
RET

CONSTAT: ;GET CONSOLE STATUS
MVI C,11 ! CALL BDOS ! RET

CONIN: ;GET KEY BASH (NO ECHO)
MVI C,6 ! MVI E,OFFH ! CALL BDOS
CPI 0 ! JZ CONIN ! RET

ILPRT: XTHL ;IN LINE PRINT
ILPLP MOV A,M ! CPI 80H ! JP ILPEND ! CALL CONOUT
INX H ! JMP ILPLP
ILPEND ANI 7FH ! CALL CONOUT ! INX H ! XTHL ! RET

ILCOMP: ;IN LINE COMPARE
XTHL ;GET POINTER TO STRING
XCHG ;GET POINTER IN D
CMC ;CLEAR CARRY
ILDAX D ;GET CHARACTER FROM STRING
CPI 80H
JP ILEND ;IF END, QUIT
CMP M ;COMPARE TO INPUT
JNZ NOCOMP ;IF NO MATCH, SET FLAG
INX H
INX D ;BUMP POINTERS AND LOOP
JMP ILP

NOCOMP INX D ;BUMP POINTER
LDAX D ;GET CHARACTER
CPI 80H ;LOOP 'TIL END
JM NOCOMP ;FALL THROUGH TO END
JMP ILEND1 ;SKIP LAST COMPARE

ILEND ANI 7FH
CMP M
ILEND1 XCHG ;GET FIXED POINTER IN H
INX ;POINT TO NEXT INSTRUCTION
XTHL ;PUT POINTER BACK ON STACK
RET

FIRST: ;SEARCH FOR FIRST
XRA A ! STA FCB+12 ! STA FCB+14 ! STA FCB+18 ;NULL OUT FCB
MVI C,17 ! LXI D,FCB ! CALL BDOS ! RET

NEXT: ;SEARCH FOR NEXT
MVI C,18 ! LXI D,FCB ! CALL BDOS ! RET

```

```

SEEDR: ;SHOW DRIVE
MVI C,25 ! CALL BDOS ! ADI 1 ! STA FCB
ADI DISKOFF ! STA DIRP ! CALL ILPRT
DIRP DB 0,CR,LF+80H
RET

SETDMA ;POINT DMA TO 0080H
MVI C,26 ! LXI D,DMA ! CALL BDOS ! RET

FILL: ;FILL MEMORY WITH A CONSTANT
MOV M,A ! INX H ! DCR B ! JNZ FILL ! RET

PRINT: ;PRINT A BUFFER
MOV A,M ! CALL CONOUT ! INX H ! DCR B
JNZ PRINT ! RET

DRVCODE: ;GET DRIVE CODE IN A, WITH OFFSET IN C
MVI C,25 ! CALL BDOS ! MOV C,A ! ADI DISKOFF+1
MOV C,A ! SUI DISKOFF ! RET

MOVE: ;MOVE FROM H TO D, LENGTH IN B
MOV A,M ! STAX D ! INX H ! INX D ! DCR B
JNZ MOVE ! RET

FIXFCB: ;GET COMAND LINE ARG INTO FCB
;FILL THE FCB WITH BLANKS
MVI A,' ' ! MVI B,11 ! LXI H,FCB+1 ! CALL FILL

;ZERO THE DISK FIELD
LVI A,0 ! STA FCB

;FIND THE SPACE BEFORE ARG
LXI H,CHRCNT ;POINT TO CHARACTER COUNT
MOV B,M ;GET IT INTO B
INX H ;POINT TO START OF BUFFER
MVI A,' ' ;LOOKING FOR SPACE

SPCSK CMP M ! JZ SPCFND ! INX H ! DCR B
JNZ SPCSK ! JMP NOARG ;CAN'T FIND START OF ARG

;FIND START OF ARG
SPCFND INX H ! CMP M ! JNZ COMT ' DCR B
JNZ SPCFND ! JMP NOARG

COMT ;COPY ARG INTO COMMAND TAIL
PUSH H ;SAVE POINTER
PUSH PSW ;SAVE A
LXI D,DMA ;POINT INTO DMA
DCX H ;BACK TO SPACE
CMPTLP MOV A,M ! STAX D ! INX H ! INX D ! MOV A,H
CPI 0 ! JZ CMPTLP ! POP PSW ! POP H

;H NOW POINTS TO ARG, SEE IF DISK SPECIFIER
SPECIF INX H ;POINT TO NEXT CHAR
MOV A,M ;GET THE CHARACTER
DCX H ;PUT H BACK
CPI DISKSP ;IS IT DISK SPECIFIER?
JNZ ARGFND ;IF NOT, WE HAVE ARG
MOV A,M ;IF YES, GET DISK
SUI DISKOFF ;MASK OFF ASCII
STA FCB ;PUT IN FCB
INX H
INX H ;POINT TO REAL ARG

;GET NAME INTO FCB
;ALSO ENTRY POINT FOR TRANSIENTS
ARGFND LXI D,FCB+1 ;POINT INTO FCB
MOV A,M ;GET FIRST CHAR IN ARG
CPI ' ' ;IF IT'S A SPACE
JZ NOARG ;WHOLE FIELD IS WILD
MVI B,8 ;OTHERWISE, GET FIELD LENGTH
ARGLP MOV A,M ;GET A BYTE
CPI ' ' ;END OF NAME?
JZ DOTFND
CPI WILDCRD ;IS IT A WILD CARD?
JNZ SAVEIT ;IF NOT, DON'T DO ?'S
PUSH H
MVI A,'?' ;FILL FCB FIELD
XCHG
CALL FILL
POP H ! INX H
JMP DOTFND ;AND PROCEED WITH DOTFOUND

SAVEIT STAX D ;SAVE IT IN FCB
INX H
INX D
DCR B
JNZ ARGLP
JMP ALLMOV

;H NOW POINTS TO DOT, GET EXT INTO FCB
DOTFND LXI D,FCB+9 ;POINT INTO FCB
MVI B,3
DOTLP INX H ;POINT H PAST DOT

```



```

MOV     A,M                ;GET BYTE
CPI     WILDCRD            ;IS IT WILD CARD
JNZ     STAEX              ;IF NOT, CARRY ON

MVI     A,'?'              ;GET WILD CHARACTER
XCHG    CALL               ;GET FCB POINTER IN H
JMP     ALLMOV             ;FILL FCB

STAEX   STAX     D
        INX      D
        DCR      B
        JNZ      DOTLP

;ALL MOVING DONE
ALLMOV  XRA      A          ;SHOW ARG WAS FOUND
        RET

NOARG   MVI      A,OFFH     ;SHOW ARG WAS NOT FOUND
        RET

OPEN:    ;OPEN FILE IN FCB
        XRA A ! STA FCB+14 ! STA FCB+32 ! MVI C,15
        LXI D,FCB ! CALL BDOS ! RET

CLOSE:   ;CLOSE FILE IN FCB
        MVI C,16 ! LXI D,FCB ! CALL BDOS ! RET

READ:    ;READ IN A SECTOR
        MVI C,20 ! LXI D,FCB ! CALL BDOS ! RET

;----
;----
;----
FUNCTIONAL CODE

TYPE:    ;TYPE A FILE
        CALL     CRLF       ;NEW LINE
        XRA      A
        STA      LINCNT     ;ZERO LINE COUNT
        CALL     FIXFCB     ;FIX UP FCB

        CPI      OFFH
        JZ       GETLIN     ;SKIP IF NO ARGS
        CALL     OPEN
        CPI      255
        JZ       TYPERR     ;SEE IF OPEN ERROR

TYPE1    CALL     READ       ;READ A SECTOR
        CPI      0
        JNZ      TYPEND     ;QUIT IF END OF FILE

        MVI      B,128      ;GET SECTOR LENGTH
        LXI      H,DMA      ;POINT TO DMA BUFFER
        MOV      A,M
        CPI      EOF
        JZ       TYPEND     ;IS IT END OF FILE?
        JZ       LF         ;IF SO, SCRAM
        CPI      LF
        JNZ      NOLF       ;IS IT NEW LINE?
        JZ       NOLF       ;IF NOT, NO BUMP

        PUSH     B          ;SAVE COUNTER
        PUSH     H          ;SAVE POINTER
        LDA      LINCNT     ;GET COUNT
        INR      A          ;INCREMENT COUNT
        STA      LINCNT     ;SAVE COUNT
        CPI      SDEEP-1
        JNZ      SEELF      ;READY FOR PAUSE?
        JZ       SEELF      ;IF NOT, JUST DO NEW LINE
        CALL     PAUSE      ;DO THE PAUSE
        CPI      BRK
        JZ       TYPEND     ;QUIT IF CTRL C
        XRA      A          ;ZERO COUNT
        STA      LINCNT     ;SAVE COUNT
        MVI      A,LF
        POP      H          ;GET LF INTO A
        POP      B          ;GET POINTER BACK
        POP      B          ;RESTORE COUNTER

NOLF     CALL     CONOUT     ;SEND CHARACTER OUT
        INX      H          ;BUMP POINTER
        DCR      B          ;AND COUNTER
        JNZ      TYPLP      ;AND GO AGAIN
        JMP      TYPE1      ;OR GET NEXT SECTOR

TYPEND   CALL     CLOSE     ;CLOSE FILE
        JMP      GETLIN

TYPERR   CALL     ILPRT     ;PRINT FILE NAME
        DB       CR,LF,'Tilt.', ' ' +80H
        MVI      B,11
        LXI      H,FCB+1
        CALL     PRINT      ;PRINT FILE NAME
        LDA      FCB        ;GET DRIVE CODE
        CPI      0          ;IF NOT AUTOSELECT
        JNZ      TYPESL     ;...SKIP CALL
        MVI      C,25
        CALL     BDOS        ;GET CURRENT DRIVE
        INR      A          ;FUDGE FOR CORRECTION

```

```

TYPESL   ADI      DISKOFF-1 ;ADD ASCII OFFSET
        STA      TYPED     ;PUT IN STRING
        CALL     ILPRT
        DB       'isn't real on drive '
        DB       ' ',' ',' '+80H
        JMP      GETLIN

DIR:      ;PRINT THE DIRECTORY
        MVI A,'?' ! MVI B,11 ! LXI H,FCB+1 ! CALL FILL

        CALL     FIXFCB     ;GET COMMAND ARGS TO FCB
        CPI      0
        JZ       NOWILD
        MVI      A,'?'
        MVI      B,11
        LXI      H,FCB+1
        CALL     FILL

NOWILD    LDA      FCB      ;GET DRIVE BYTE
        CPI      0          ;IF AUTOSELECT
        CZ       DRVCODE    ;GET DRIVE CODE
        ADI      DISKOFF    ;ADD ASCII OFFSET
        STA      DIRBY     ;SAVE IT IN LITTERAL
        CALL     ILPRT     ;SHOW THE LITTERAL
        DB       CR,LF,'Directory of drive '
        DB       ' ',' ','CR,LF+80H

DIRBY     CALL     FIRST    ;GET FIRST MATCH
        CPI      OFFH       ;IF NO MATCH
        JZ       NOFILE    ;SAY SO
        CALL     SHFILE     ;ELSE SHOW FILE NAME
        CALL     NEXT       ;GET NEXT MATCH
        CPI      OFFH       ;IF NO MATCH
        JZ       DIREND     ;ALL DONE
        CALL     SHFILE     ;ELSE SHOW FILE
        JMP      DIRLP      ;AND LOOP

NOFILE    CALL     ILPRT
        DB       'No file', 's'+80H

```

PRODUCT MART

Where Buyers Seek Sellers!

Now an advertising features where companies can reach thousands of Software Now!, Computers in Education, Electronics Today, and Computing Now! readers on a nation-wide basis to sell products and services and where individuals can sell, trade or swap hardware, software or just information.

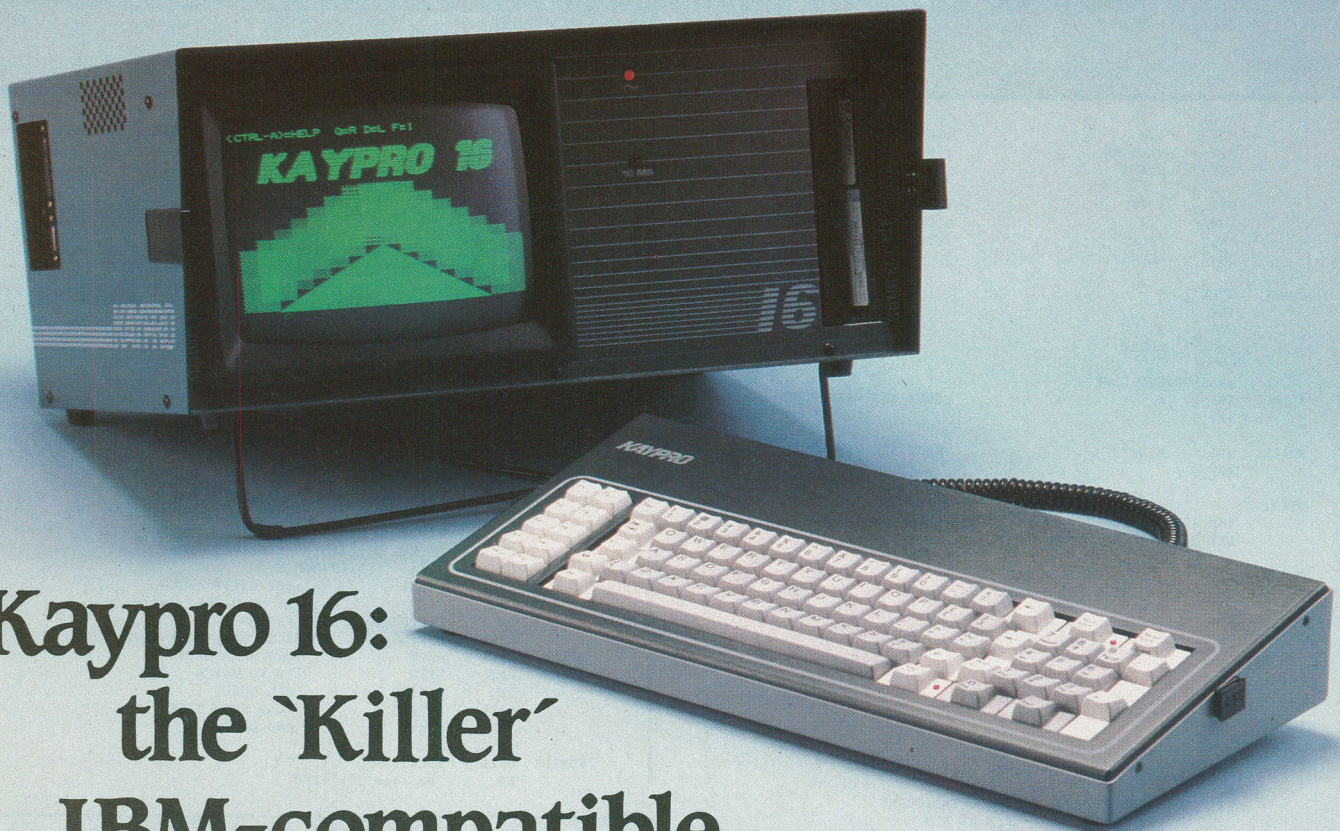
Look for this month's issue of Software Now!, Computers in Education, Electronics Today and Computing Now!. It's a classified advertising forum for readers and advertisers alike.

For advertising information call Dierdre Whitehead at (416) 423-3262 or write:

**Moorshead
Publications**

Suite 601, 25 Overlea Blvd.,
Toronto, Ontario M4H 1B1

Publishers of Electronics Today, Computing Now!, Computers in Education,
and Software Now!



Kaypro 16: the 'Killer' IBM-compatible beats the competition

At a time when technical innovation is so abundant it sometimes causes a yawn, Computron is proud to introduce the Kaypro 16 to Canada.

Kaypro 16 has features even the most blasé will sit up and notice. The Kaypro 16 is totally IBM-compatible. It actually enjoys the so-called "Killer" software others choke on. And, the Kaypro 16 can safely boast the lowest price of all competitive systems on the Canadian market today.

If that's not enough, count the standard features:

- 10 Mb hard disk plus 360K floppy
- 256K Bytes, expandable to 640K Bytes without further memory board purchases
- Serial and parallel ports
- Built-in monochrome graphics screen with RGB and composite video interfaces built-in for use with an external colour monitor

- Totally IBM-compatible keyboard
- Comprehensive name-brand software including MS-DOS 2.11, GW-Basic™, WordStar™, MailMerge™, CalcStar™, InfoStar +™ (DataStar™, ReportStar, FormSort), StarBurst™ and MITE™ Communications – all with full interactive tutorials.

Now, you ask, what does all this cost? Just \$5195 or less.

Call or write today for a dealer near you and see for yourself why Kaypro 16 is a "Killer."

TORONTO: 55 Torbay Road
Unit #2, Markham, Ontario L3R 1G7
(416) 477-0828

HEAD OFFICE: 17507-107 Avenue
Edmonton, Alberta T5S 1E5
(403) 489-8400 Telex: 037-42881

Circle No. 9 on Reader Service Card

Computron

BeatNix for CP/M

```

DIREND JMP GETLIN ;GET NEXT COMMAND

SHFILE: ;SEE A FILE ENTRY
LXI H,DMA
RLC ! RLC ! RLC ! RLC ! RLC
LXI D,0
MOV E,A
DAD D
INX H
MVI B,11
CALL PRINT
CALL ILPRT
DB ' ',' '+80H
RET

CDIR: ;CHANGE DRIVES
LDA CMDLIN+6 ;GET ARG
SUI DISKOFF+1 ;MASK OFF ASCII
CPI MAXDSK ;
JP GETLIN ;
MVI C,14 ;SET UP FOR BDOS
MOV E,A ;GET ARG INTO E
CALL BDOS
JMP GETLIN ;
JP GETLIN ;
MVI C,14 ;SET UP FOR BDOS
MOV E,A ;GET ARG INTO E
CALL BDOS
JMP GETLIN

TRANS: ;RUN A TRANSIENT
LXI H,FCB+1 ! MVI A,' ' ! MVI B,11 ! CALL FILL
XRA A ! STA FCB ;SET UP CLEAN FCB

LXI H,CMDLIN ;MOVE NAME INTO FCB
LXI D,FCB+1
MVI B,8
TRANSB MOV A,M
CPI ' '
JZ TRANSA
STAX D
INX H
INX D
DCR B
JNZ TRANSB

TRANSA LXI H,COM ;ADD COM TO END
LXI D,FCB+9
MVI B,3
CALL MOVE

CALL LOAD ;LOAD MEMORY WITH FILE
CPI 0 ;IF UNCOOL, SAY SO
JNZ UNCOOL

CALL FIXFCB ;MAKE UP FCB FOR TRANSIENT
CALL CRLF ;SHOW NEW LINE ON THE TUBE
CALL SETDMA ;SET DMA TO 0080
LXI SP,TPA ;SET STACK POINTER
XRA A ;
STA CHRCNT ;ZERO COMMAND POINTER
IF NOT DEBUG
CALL TPA ;CALL TRANSIENT
ENDIF
JMP CPR1 ;NEXT...

HELP: CALL ILPRT
DB 26,9 ;CLEARS SCREEN & TAB
DB 'BeatNix Version ',VERS+'0',SUBVERS+'0'
DB ' Copyright 1985 (c) Steve Rimmer',CR,LF
DB 'The BeatNix operating system is a small console '
DB 'command processor which is',CR,LF
DB 'designed to have better karma and general '
DB 'vibrations than those of more',CR,LF
DB 'involved human interfaces. It features four '
DB 'built in commands, to wit:',CR,LF,LF
DB 9,9,9,'HELP',9,'Sorts out the lost.',CR,LF
DB 9,9,9,'FILES',9,'Shows the directory.',CR,LF
DB 9,9,9,'CAT',9,'Heaves files to the tube.',CR,LF
DB 9,9,9,'DRIVE',9,'Changes drives.',CR,LF,LF
DB 'The first drive is referred to as '
DB 1+DISKOFF,DISKSP,'.',CR,LF,LF
DB '"It's better to have a brain and not need it '
DB 'than to need a brain',CR,LF
DB 'and not have it."' ,CR,LF,9,9,9,9,9,9,9
DB '-Alonzo the Frog Farmer',CR,LF,LF+80H
JMP GETLIN

DS 20
STACK DS 2

```

```

ZZZEND EQU $-CCP ;MUST BE LESS THAN 0800H

END

```

De Bugs

The only other real mystery involved in BeatNix is the DEBUG equate. This is normally set FALSE, which produces a BeatNix that does what it's supposed to do.

Setting DEBUG TRUE will cause the program to generate a HEX file which can be run through LOAD to produce a runnable COM file. In other words, it ORGS at 0100H, just like any other program. This makes it a lot easier to develop new internal commands and such.

The DEBUG version of BeatNix also adds a command to the code, to wit, MON. It's intended to be used in conjunction with DDT. If you DDT BEATNIX.COM and then GO100 you'll find yourself in BeatNix. You can run any of the built in commands. If you try to run a transient it will load in at 8000H... don't try any really large transients... but it won't execute, for obvious reasons.

You can enter DDT any time you want to with the MON command. This finds DDT in a fairly obscure way by executing a RST 7 instruction. RST 7 leaps to a vector in low memory which DDT establishes for just this purpose. You can, as such, examine the results of whatever you caused BeatNix to do.

Having gotten BeatNix up and running in its current form you will probably want to hack with it. It sort of cries out with a plaintive wailing for enhancements and modifications. The only restriction in doing so is to be sure that the equate ZZZEND is less than 0800H... you can see it if you type BEATNIX.SYM. It's the last equate in the file. Dire things will happen if this value exceeds its station in life.

BeatNix can be a practical operating system if you are particularly dissatisfied with CP/M. However, it can also be a great way to learn about the internals of CP/M. It's a blistering programming challenge if you've become bored with writing three level chess programs and intelligent coffee pot controllers. **CNI**

Assembling Graphics on the PC



A few years ago you were probably unaware of what a pixel was, and were very pleased to be so. Now, mayhaps, they scramble about in the dark corners of your mind like the mice that live under your disk drives. Here's a look at some techniques for taming them with an assembler.

by Steve Rimmer

Of all the sublime and cerebrally exalted endeavours of mankind, none has surpassed the wanton pleasure of slaughtering glowing blue aliens for sheer joy and amusement. I mean, what could be more enlightening, more exhilarating, more spiritually rewarding than staring at a tube going slowly blind while the little phosphor Martians bite it in a cloud of superheated pixels?

Everyone who answered "washing socks" can go back to watching Masterpiece Theatre. I'll be there in a moment as soon as I finish this article.

A good video game is usually hinged on surrealistic looking high resolution graphics. Unfortunately, many systems, while theoretically supporting such things, don't really give the common unwashed access to them to any great degree. High resolution stuff under BASIC is traditionally glacially slow, while handling it from assembler usually requires masses of tricky code.

Doing high resolution plotting at the assembler level on the IBM PC is not nearly as weird as it is on other systems, such as the Apple II+. The relationship of the pixels on the glass to the memory which holds them, while by no means simple, is none the less fathomable if you do enough drugs. More to the point, there is a system call which will do all the weird math for you, and smoke them pixels where ever you want 'em.

In this feature we're going to have a blast at the high resolution ROM BIOS routines and some of the techniques involved in using them.

Dancing Aliens

The program in listing one is not remarkably useful and only marginally entertaining as it stands. It is, in fact, a demonstration illustrating the use of the code involved in handling high resolution shapes.

As you will check out for yourself if you decide to expand the dancing aliens program into something practical, even trivial graphics programs involve massive amounts of code. It's probably been written down somewhere... and subsequently lost due to a disk error... that doubling the number of variables in a machine language program increases the complexity of the resultant code by a factor of ten.

When you run this program the first thing of any importance that it does is to set the screen to mode four, which is defined as being a graphics screen with three hundred and twenty by two hundred dots. The dots can each be any of four colours. The four colours, in turn, can be selected from two groups, or *palettes*.

The dots which turn up on the screen are held in the memory on the video card, starting in segment 0B800H. Each byte... a byte being eight bits... holds the information defining four dots. This will take a bit of a brain dance to figure out. Each dot can be one of four colours, which means that two bits can define it. Two bits can be in any of four unique states. Thus, four two-bit groups can live in one byte, and each byte holds four pixels.

The simplest and fastest way to do high resolution graphics, then, is to put the screen in a graphics mode and POKE the appropriate bits into the appropriate part of RAM. This works and, in fact, is how a lot of video games and other fast high resolution things do their stuff. However, while the code to do this is fairly straight up, figuring out how the bits are supposed to be arranged and where in the screen RAM they have to live is something of a party.

This being an introduction the sacred mysteries, we'll leave that particular ritual for another day.

There is some fine print in the 10H interrupt which will plot high resolution pixels. By comparison with the procedure of ham-

mering bytes into the screen RAM, this bit of code is trivially easy to handle. You put the horizontal position in the CX register, the vertical position in the DX register, the colour of the dot in AL... it has to be between zero and three... twelve in AH and throw the interrupt. Unless there is a troll in your computer or a monochrome display card in your peripheral section the dot will show up on the screen.

This is the heart of the dancing aliens program. It takes place in the PLOTDOT procedure. It could be replaced with a rather more complicated routine to figure out the bit position of the dot and thereupon AND and OR the screen memory... the code is about twenty lines long, and improves on the access time of the BIOS call by about half again. However, the intention in this thing was to keep the works fairly simple.

The ability to plot dots on the screen is not the end of the quest. BASIC offers quite a number of ways to handle this facility... the IBM's BIOS does not. Drawing a line, for example, involves writing the appropriate code as part of your program.

This program plots shapes on the screen. In a sense, it draws large characters using the BIOS plotting call, in much the same way that the BIOS plots ASCII characters when instructed to print something when the screen's in a graphic mode.

A shape can be any size, although the code to handle shapes larger than sixteen bits on a side becomes a bit more involved. Along these lines, it's desirable to have the size of the shape some even multiple of eight, as well.

The working of the shapes can be easily understood if you check out one of the shape tables at the top of the program. The stuff after the semi-colon in each line in ALIEN1, for example, is a binary representation of the sixteen bit entry in the table. There are sixteen entries in each table.

The code will scan the table one bit at a time. Each high bit will show up on the screen as a lit pixel. Each low bit will be a dark pixel... actually, a pixel turned on to the background colour. As you can see in the binary stuff, the bits represent the shapes of the aliens fairly clearly.

You can, in fact, do this directly by specifying the table entries in binary...

DW 007E99H

can also be represented as

DW 0000011111100000B

As such, you can create your own shape tables fairly quickly.

The Shape of Things

The SHAPE procedure is the most complex bit of the program. It decodes the shape table information and represents it as pixels on the screen.

While it is possible to handle all of the information passed between the various routines in registers, the resultant pops and

MPF-PC & XT... more talented than the others!

The Multitasking & Windowing/
MPF-PC & MPF-PC/XT from ...



The MPF-PC & XT from Multitech features the state-of-the-art hardware and the newest and most powerful development in microcomputer software; the Concurrent CP/M-86 (CCP/M-86) operating system from Digital Research.

The multitasking and windowing MPF-PC under CCP/M-86 allows the user to increase his productivity while retaining the quality of his work. It enables the user to continue working interactively during time consuming tasks such as printing, sorting, spelling check, database access, and compiling.

The CCP/M-86 operating system also has a PC-MODE option to emulate the software environment of PC-DOS.

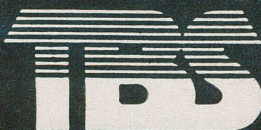
With Microsoft's MS-DOS, the MPF-PC offers learners and professionals alike the choice of two of the world's hottest operating systems! You get the power to run popular IBM-PC software such as Lotus 1-2-3, Multimate, PFS File, Wordstar, Framework, dBase III, Flight Simulator, etc.

Competitively
Priced!



Featuring:

- Concurrent CP/M-86 & MS-DOS operating systems
- 8088 CPU (optional socket for 8087)
- One RS-232C serial port
- One Centronics parallel port
- Colour graphics board with composite and RGB output, and interface for light pen
- Detachable 90-key keyboard
- Five IBM-PC compatible expansion slots
- 256K memory expandable to 640K - MPF-PC (384K memory expandable to 640K - MPF-PC/XT)
- Dual floppy disk drives with 720KB capacity - MPF-PC (Single 360KB floppy plus 10MB hard drive - MPF-PC/XT)



Exclusively distributed by:

TITHES BUSINESS SYSTEMS (CANADA) INC.

971 W. Broadway, Vancouver, B.C. Canada V5Z 1K3

Tel: (604) 733-8999. Telex: 04-53436

"Currently Seeking Limited Dealers Across Canada"

Dealers'
Inquiries
Invited

Assembling Graphics on the PC

pushes would take up a lot more room and a lot more time than does using memory stashes for the passed parameters. As such, all of the information passed to the SHAPE routine is stored in the appropriate buffers before it's called, and it, in turn, sucks out what it needs.

It isn't all that apparent when you look at it, but SHAPE consists of two nested loops, analogous to FOR NEXT loops in BASIC. It can be seen as

```

110 'SHAPE PROCEDURE
120 C = XPOS
130 D = YPOS
140 B = SHAPELOCATION
150 T = C
160 FOR Y = 1 TO 16
170   S = SHAPE(Y)
180   FOR X = 1 TO 16
190     'SET FLAG FOR DARK PIXEL
200     'SEE IF BIT X IS SET
210     'IF IT IS, SET FLAG FOR LIGHT PIXEL
220     GOSUB PLOTDOT
230   NEXT X
240 NEXT Y
    
```

This part of the code is what puts the sixteen bit ceiling on simple shapes. It is, however, what makes the works fairly uncomplicated for shapes within this range. The 8088 can manipulate sixteen bits as one word. We can have it check the status of any bit... or combination of bits... in a register by setting them high in another register and using the TEST instruction. TEST performs a non-destructive AND. If the test is successful... that is, if the bits match... the Z flag will be low.

The inner loop of the SHAPE procedure starts with the line of the shape in AX and BX setup with its highest bit set and all the others unset... this corresponds to 8000H. It tests AX against BX. If the highest bit of AX is set it signals PLOTDOT to plot a lighted pixel. Otherwise it will plot a background pixel.

COMMENT /

*** Watch the dancing aliens ***

Sample code for the use of the ROM BIOS
high resolution dot plotter and bit shapes
for the IBM PC

Copyright 1985 (c) Steve Rimmer

"That not busy being worn is busy drying"
-Dylan

/

```

CODEX SEGMENT
MAIN PROC FAR
ASSUME CS:CODEX
ORG 0100H ;START OF TPA
START: JMP BEGIN ;LEAP OVER FIXED BYTES

; THIS BE THE ALIEN, ME BUCKOS
ALIEN1: DW 00000H ;0000000000000000
        DW 00000H ;0000000000000000
        DW 007E0H ;0000011111100000
        DW 00FF0H ;0000111111100000
        DW 01FF8H ;0001111111110000
        DW 01DB8H ;0001101101100000
        DW 00FF0H ;0000111111100000
        DW 00660H ;0000011001100000
        DW 00BDOH ;0000101111010000
        DW 01188H ;0001000110001000
        DW 02244H ;0010001001000100
        DW 04002H ;0100000000000010
        DW 02004H ;0010000000000100
        DW 01008H ;00010000000001000
        DW 00810H ;00001000000100000
        DW 00000H ;0000000000000000
    
```

```

ALIEN2: DW 00000H ;0000000000000000
        DW 00000H ;0000000000000000
        DW 007E0H ;0000011111100000
        DW 00FF0H ;0000111111100000
        DW 01FF8H ;0001111111100000
        DW 01DB8H ;0001101101100000
        DW 00FF0H ;0000111111100000
        DW 00660H ;0000011001100000
        DW 00BDOH ;0000101111010000
        DW 01188H ;0001000110001000
        DW 01248H ;0001001001001000
        DW 00810H ;0000100000010000
        DW 00420H ;0000010000100000
        DW 00240H ;0000001001000000
        DW 00420H ;0000010000100000
        DW 00000H ;0000000000000000
    
```

```

SHAPNT: DW 0000H ;BUFFER FOR SHAPE POINTER
XPOS: DW 0000H ;BUFFER FOR X DOT POSITION
YPOS: DW 0000H ;BUFFER FOR Y DOT POSITION
COLOUR: DW 0000H ;BUFFER FOR COLOUR
XSTSH: DW 0000H ;BUFFER FOR LEFT MARGIN
DOTON: DW 0000H ;BUFFER FOR DOT COLOUR
DOTOFF: DW 0000H ;BUFFER FOR BACKGROUND COLOUR
ADIR: DW 0001H ;BUFFER FOR DIRECTION
    
```

```

BEGIN: CALL CLRSRN ;CLEAR DE GLASS
        CALL GRMODE ;SET GRAPHICS MODE
    
```

```

CALL ILPRT
DB 'The dance of the stoned out aliens',13,10
DB '[ Hit the space bar to stop the party ]',0
    
```

```

MOV [XPOS],20 ;SET INITIAL X POSITION
MOV [YPOS],50 ;SET INITIAL Y POSITION
MOV [DOTOFF],0000H ;SET BACKGROUND COLOUR
MOV [DOTON],0001H ;SET FOREGROUND COLOUR
MOV BX,OFFSET ALIEN1 ;POINT TO FIRST ALIEN
MOV [SHAPNT],BX ;POINT TO ALIEN 1
    
```

```

NEWSHP: CALL SHAPE ;DISPLAY CURRENT SHAPE
MOV AH,1 ;SEE IF THERE'S A KEYPRESS
INT 16H
JZ NOKEY ;IF NOT, DON'T GET LOST
CMP AL,20H
JE EXIT
    
```

```

NOKEY: MOV AX,[XPOS] ;GET PRESENT POSITION
CMP AX,290 ;IS IT RIGHT EDGE?
JE GOLEFT ;IF SO, REVERSE
CMP AX,2 ;IS IT LEFT EDGE?
JE GORITE ;IF SO, REVERSE
MOV BX,[ADIR] ;GET THE DIRECTION
ADD AX,BX ;ADD IT TO THE OLD POSITION
MOV [XPOS],AX ;AND UPDATE MEMORY
    
```

```

SWAPAL: MOV AX,[SHAPNT] ;GET THE ALIEN POINTER
MOV BX,OFFSET ALIEN1 ;GET LOCATION OF FIRST ALIEN
CMP AX,BX ;SEE IF THEY MATCH
JE SETAL2 ;IF SO, POINT TO SECOND ALIEN
MOV [SHAPNT],BX ;IF NOT, POINT TO FIRST ALIEN
JMP NEWSHP ;AND DO NEW SHAPE
SETAL2: MOV BX,OFFSET ALIEN2; ;POINT TO FIRST ALIEN
MOV [SHAPNT],BX ;GET IT INTO MEMORY
JMP NEWSHP ;AND GO DO SHAPE
    
```

```

GOLEFT: MOV AX,OFFF0H ;CHANGE DIRECTION TO -1
MOV [ADIR],AX ;PUT IT IN MEMORY
DEC [XPOS] ;MOVE ALIEN 1 LEFT
JMP NEWSHP ;AND DO NEW SHAPE
    
```

```

GORITE: MOV AX,0001H ;CHANGE DIRECTION TO +1
MOV [ADIR],AX ;PUT IT IN MEMORY
INC [XPOS] ;MOVE ALIEN 1 RIGHT
JMP NEWSHP ;AND DO NEW SHAPE
    
```

```

EXIT: CALL TXMODE ;RESTORE SCREEN
INT 20H ;BACK TO DOS
    
```

```

MAIN ENDP
    
```

+++ UTILITY SUBMARINES +++

```

TXMODE PROC NEAR ;SET SCREEN TO 80 X 25 TEXT
MOV AL,2
MOV AH,0
INT 10H
RET
TXMODE ENDP
    
```

```

GRMODE PROC NEAR ;SET SCREEN TO 320 X 200 GRAPHICS
MOV AL,4
MOV AH,0
    
```


THEY TALK

TO EACH OTHER.

hp HEWLETT
PACKARD

IBM
Personal
Computer

THE PORTABLE.

The best portable business computers never stand alone. That's why The Portable from Hewlett-Packard is completely connectable to the IBM® PC, XT and the Hewlett-Packard Touch-screen PC. Simply add The Portable-Desktop Link and you can exchange files with surprising ease.

The Portable lets you take serious business computing power anywhere...656K of memory (including 272K of user memory) and a full 16-bit processor. That's enough power to get maximum use of 1-2-3™ from Lotus™ and MemoMaker,

Hewlett-Packard's word processing program. Both are permanently built in. The Portable even features a built-in modem and easy-to-use telecommunications software. The Portable can operate on AC or battery power and it weighs only nine pounds. The Portable...a remarkable machine. But then consider where it came from.

See The Portable and the entire family of personal computers, software and peripherals at your authorized Hewlett-Packard dealer. Call 1-800-387-3867 for the dealer nearest you.

Setting You Free



IBM is a registered trademark of International Business Machines Corporation. 1-2-3 and Lotus are trademarks of Lotus Development Corporation.

Circle No. 10 on Reader Service Card.

Assembling Graphics on the PC

```

        INT     10H
        RET
GRMODE  ENDP

PLOTDOT PROC    NEAR                ;PLOT A DOT ON THE TUBE
        PUSH    AX
        PUSH    BX
        PUSH    CX
        PUSH    DX
        MOV     AX,[COLOUR]        ;SAVE ALL RESISTERS
        MOV     CX,[XPOS]          ;GET THE COLOUR
        MOV     DX,[YPOS]          ;GET THE HORIZONTAL POS
        MOV     AH,12              ;GET THE VERTICAL POS
        INT     10H                ;SET UP FOR CALL
        POP     DX                  ;FIRE PHASORS, SCOTTY
        POP     CX
        POP     BX
        POP     AX                  ;RESTORE REGISTERS
PLOTDOT ENDP

SHAPE   PROC    NEAR                ;SHOW SHAPE ON TUBE
        MOV     CX,[XPOS]          ;GET X POSITION
        MOV     DX,[YPOS]          ;GET Y POSITION
        MOV     BX,[SHAPNT]        ;GET SHAPE POINTER
        PUSH    BX                  ;SAVE ALL USEFUL POINTERS
        PUSH    CX
        PUSH    DX
        MOV     [XSTSH],CX         ;SAVE X POSITION FOR INTERNALS

        MOV     CX,16              ;VERTICAL POSITION LOOP
WDTEST: PUSH    CX                  ;SAVE IT (OUTER LOOP)

        MOV     BX,[SHAPNT]        ;POINT TO SHAPE
        MOV     AX,[BX]            ;GET FIRST WORD IN AX
        MOV     BX,8000H           ;GET HIGH BIT OF BX SET

        MOV     CX,16              ;HORIZONTAL POSITION LOOP
BITEST: PUSH    CX                  ;SAVE IT (INNER LOOP)
        MOV     DX,[DOTOFF]        ;SET DOT OFF
        TEST    BX,AX              ;SEE IF BIT IS HIGH
        JZ      NOBIT              ;IF NOT, LEAVE DOT OFF
        MOV     DX,[DOTON]         ;ELSE TURN DOT ON
        MOV     [COLOUR],DX        ;STASH DOT COLOR
        CALL    PLOTDOT            ;PLOT DOT AT CURRENT POSITION
        ROR     BX,1               ;MOVE TEST FLAG DOWN ONE
        INC     XPOS                ;INCREMENT X LOCATION POINTER
        POP     CX                  ;GET COUNTER (INNER LOOP)
        LOOP    BITEST             ;AND LOOP 'TIL DONE

        INC     [SHAPNT]            ;POINT INTO NEXT WORD OF SHAPE
        INC     [SHAPNT]            ;2 INC'S, 'COZ IT'S 16 BITS

        MOV     CX,[XSTSH]          ;MOVE X LOCATION BACK TO START OF LINE
        MOV     [XPOS],CX

        INC     [YPOS]              ;INCREMENT Y POSITION

        POP     CX                  ;GET COUNTER (OUTER LOOP)
        LOOP    WDTEST             ;LOOP 'TIL DONE

        POP     DX
        POP     CX
        POP     BX                  ;RESTORE STACK
        MOV     [SHAPNT],BX         ;RESTORE SHAPE POINTER
        MOV     [YPOS],DX           ;PRESERVE INITIAL STARTING
        MOV     [XPOS],CX           ;POSITIONS

        RET
SHAPE   ENDP

CLRSCRN PROC    NEAR                ;CLEAR THE SCREEN
        MOV     CX,0
        MOV     BH,7
        MOV     DH,24
        MOV     DL,79
        MOV     AL,0
        MOV     AH,6
        INT     10H
        MOV     DX,0
        CALL    POSIT              ;HOME CURSOR
        RET
CLRSCRN ENDP

ILPRT   PROC    NEAR                ;IN LINE PRINT
        POP     BX
        MOV     DL,[BX]
        CMP     DL,0
        JE      ILPRET
        MOV     AH,2
        PUSH    BX
        INT     21H
        POP     BX
        INC     BX

```

```

        JMP     ILPLP
ILPRET: INC     BX
        PUSH    BX
        RET
ILPRT   ENDP

POSIT   PROC    NEAR                ;SET CURSOR POSITION
        MOV     AH,15
        INT     10H
        MOV     AH,2
        INT     10H
        RET
POSIT   ENDP

CODEX   ENDS
        END     START

```

All of the pixels in a shape are plotted, lit or not. This makes moving the shapes fairly easy. The outermost pixel along all four borders of the shapes is dark, so that, so long as the shape is moved in one pixel increments, it will always erase the previous shape.

Having plotted a pixel, SHAPE rotates the BX register one place right, which moves the high bit down one, and tests it against AX again. If it does this a total of sixteen times... once for each bit in the word... it will turn up all the lit pixels.

Aside from deciding which pixels should be lit, SHAPE must also determine where they should go. Plotting a single line is fairly straight up... we just increment the XPOS pointer with each successive pixel. However, upon moving to the next line... the next word in the table... the pointer must be returned to the left edge of the shape. We could just subtract sixteen from it, but it's equally simple to have stored the original value in a buffer... XSTSH in this case... and thereafter restore it.

It's important to realize that SHAPE will display any sixteen words... thirty two bytes... as a shape on the screen. It can do some first rate abstract art of you have it point at some code. This is a good trip, as it allows one to change what the shape will look like instantaneously by simply changing the pointer in SHAPNT. In this example, there are two tables for the alien. It appears to move its legs by flipping back and forth between the tables.

Masterpiece Theater Awaits

If you run this program for any video game freaks you happen to know you probably won't impress them... a blue alien skitters back and forth across the screen. Hit the space bar and it vanishes. The action will keep many users amused for seconds.

Having worked out the mechanism for handling high resolution images, however, you should be able to expand this simple code into some really serious programming. Not only will you be able to kill aliens, but intelligent gas clouds, lizard princesses, cosmic star fighters and the ever popular half mad green Toyotas from the caves of the nether reaches. That last one has a lot of potential. Blasting Toyotas into their component molecules is something almost anyone can relate to.

CNI

Q: What do you get when you cross an Apple with an IBM?

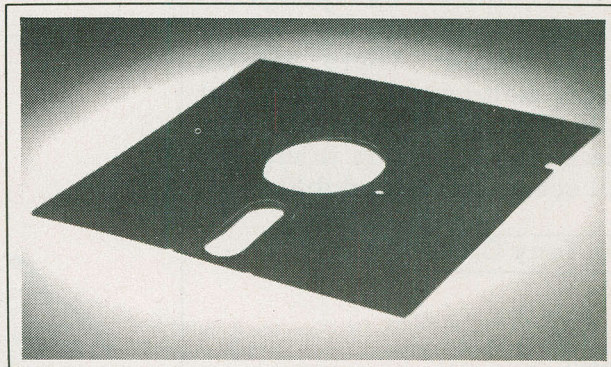
A: A *FREE* software disk... if you subscribe NOW!

We've heard tell of many of our readers braving snapping winter frosts and slushy spring sidewalks just to pick up copies of their favourite Canadian magazines. The rumours appear to be true, and every time there's an influenza epidemic, the Board of Health raises their eyebrows at us.

Fortunately, there's an alternative to all this human suffering... and a very good one, indeed.

If you subscribe... or extend your subscription... to Computing Now!, Software Now! or Electronics Today magazine *before the May issues go to press*, we'll not only send you the best in Canadian publishing every month at a substantial savings over newsstand prices, but we'll also send you some software to keep you indoors... away from the cold and the viruses.

The Completely Free Software Disk is actually two disks in one. One side has a plethora of Apple DOS programs, and the other side is laden with IBM files. Blessed are the subscribers with access to both computers...



As its title implies, the Completely Free Software Disk is just that... **FREE**. However, it's only being offered to readers subscribing now or subscribers extending their present subscriptions, and only for a limited time. We regret that we'll be unable to supply the Completely Free Software Disk as a subscription bonus to orders postdated after **May 1, 1985**, so please subscribe or extend your subscription today to avoid disappointment.

Side One: Apple DOS files

Apple Binary Encryption and Apple Binary Decryption, with source files: Programs to keep peering eyes from your valuable data. See the article in the February 1985 issue of CN!

RacquelPic: An Apple HiRes implementation of the CPM teletype drawing offered in Almost Free Software Volume II.

HGR Dump: A BASIC editor that lets you preselect options before sending your HiRes picture to the printer. Written for a Dumping-GX card, but easily modified.

HGR Invert: A fast binary program that displays the 'negative' of any HiRes picture in memory. BRUNning it again restores the picture.

Magfiler: A magazine article database in Applesoft BASIC. The February issue of CN! has already been entered to get you started.

Miniature Golf: A binary HiRes game of golf, with a truly wicked course. The sixth hole's a dandy.

Memtest: This short, two-sector binary program comes in handy when your Apple starts to hiccup. It writes and reads to memory from \$0800 to \$BFFF. Three passes and your RAM's in fine shape.

Forced Read, with source: A short binary program originally appearing in Electronics Today, this program has incredible error handling.

APCPM: A handy utility for the Applesoft user who also dabbles in CPM, this program will read a text file up to 16K in length from an Apple CPM disk and write it to a DOS disk. Known affectionately as 'Reverse APDOS'.

DM II: From the Apple User Group of Sweden comes forth this DOS modifying program that allows you to change commands, error messages, catalog headers and volumes, and even fiddle with DOS entry points.

Star Patrol: An Applesoft implementation of the HiRes ADAM program appearing in the February edition of CN!. Your mission is to shoot elusive space bats.

Attenuators: An Applesoft BASIC program to aid calculating resistance and loss.

Capacitors: A similarly Applesoft BASIC program to help calculate capacitance and frequency response.

Side Two: IBM files

SD: An acronym for Sorted Directory, this program produces a more visually appealing directory than can be had from the MS-DOS DIR command.

FORTH: A small BASIC implementation of FORTH. You can expand the primitives or add new ones as they become necessary.

Datafile: Everyone needs a database manager. This one's written in Microsoft BASIC.

Blueterm, with source: A terminal program for the PC. Suggested hardware requirements include a modem...

Poker! A BASIC program pitting you against your PC. Where's that straight flush when you need it?

Bandit: An alternative to that Las Vegas trip you've been planning. Appearing in the June issue of CN!, this BASIC program simulates a one-armed bandit.

CalcNOW! A spreadsheet program written in BASIC. While very good at what it does, we don't expect Lotus to be nervous.

Cashacc: Written in BASIC, this is a cash acquisition and limited accounting package for the PC.

UnWS, with source: When you TYPE a WordStar file, you usually get garbage. This program strips the high bits from the WS file of your choice to make it legible again.

Note: Neither the Apple nor the IBM disk sides are bootable. Both Apple DOS 3.3 and MS-DOS are copyrighted disk operating systems, property of (respectively) Apple Computers Incorporated and Microsoft Corporation. In order to read the files on the Completely Free Software Disk, first boot a disk with either DOS 3.3 or MS-DOS on it, then either CATALOG or DIR the side that's relevant to your machine.

From this point, you'll be able to run the applications programs, though it's suggested that you copy the files onto another disk.

All of the programs appearing on the Completely Free Software Disk have either been written in-house, or are believed to be in the public domain.

The Completely Free Software Disk is available only in Apple/IBM format.

SAVE UP TO 55% AND RECEIVE A FREE DISK!

To: **Moorshead Publications,**
25 Overlea Blvd., Suite 601,
Toronto, Ontario, M4H 1B1 (416) 423-3262

YES, please extend ☐ start ☐ my subscription(s) today! I understand that I may cancel my subscription at any time and receive a refund on the unexpired portion.

Computing Now!	1 Year \$22.95 <input type="checkbox"/>	2 Years \$37.95 <input type="checkbox"/>
Software Now!	1 Year \$19.95 <input type="checkbox"/>	2 Years \$34.95 <input type="checkbox"/>
Electronics Today	1 Year \$19.95 <input type="checkbox"/>	2 Years \$34.95 <input type="checkbox"/>

☐ Cheque/Money Order enclosed. ☐ Visa ☐ MasterCard ☐ Am. Exp.

Card No. _____ Expiry Date _____

Name _____

Address _____

City _____

Province _____ Post Code _____

Commodore List Debugger

It's hard to know what to call a Commodore 64 program listing... but "freaky" seems fairly decent. There are all those weird symbols and other bits of graphics paraphernalia. Here's a bit of code to make it all seem understandable.

By Tony Cross

Printing out Commodore listings is like printing out anything else on a computer... except for those unusual graphics characters. These can be a bit of a problem. They drive the printer quite satisfactorily... if you have a Commodore printer... but only the most proficient Commodore users can decipher them.

If you like to keep hard copy listings of your programs... or you want to give your printouts to friends and other people silly enough to want to figure out what they do... strings of inverse control symbols will probably prove pretty untractable.

You can, of course, write in the corrections by hand. However, this article features a machine language listing for the Commodore 64 which does all the work for you. List a program to the printer with it in place and all those cryptic control codes will turn up in somewhat plain English.

It sounds like a miracle, and well it should.

```

10 033C      |
20 033C      |
30 033C      |
40 033C      |
50 033C      |
60 033C      |
70 033C      |
80 033C      |
90 033C      |
100 033C     |
110 033C     |
120 C000     |
130 C000     |
140 C000     |
150 C000 4C53C2 ENTRY      JMP BEGIN
160 C003     |
170 C003     |
180 C003     |
190 C003     |
200 C003     |
210 C003     |
220 C003     |
230 C003     |
240 C003     |
250 C003 0000  LNKPTR      WORD 00000
260 C005 00   QOTFLG      BYT 000
270 C006 00   COLFLG      BYT 000
280 C007 00   REFLG       BYT 000
290 C008 00   CLOWR       BYT 000
300 C009 00   BUFPTR      BYT 000
310 C00A 00   LINLEN      BYT 000
320 C00B 00   NUMCHR      BYT 000
330 C00C 00   SPNCNUM      BYT 000
340 C00D 00   WIDTH       BYT 000
350 C00E      |
360 C00E      |
370 C00E      |
380 C00E      |
390 C00E      |
400 C00E      |
410 C00E      |
420 C00E      |
430 C00E      |
440 C00E      |
450 C00E      |
460 C00E      |
470 C00E      |
480 C00E      |
490 C00E      |
500 C00E      |
510 C00E      |
520 C00E      |
530 C00E      |
540 C00E      |
550 C00E      |
560 C00E      |
570 C00E      |
580 C00E      |
590 C00E      |
600 C00E      |
610 C00E      |
620 C00E      |
630 C00E      |
640 C00E      |
650 C00E      |
660 C00E      |
670 C00E      |
680 C00E      |
690 C00E      |
700 C00E      |
710 C00E      |
720 C00E      |
730 C00E      |
740 C00E      |
750 C00E      |
760 C00E      |
770 C00E      |
780 C00E      |
790 C00E      |
800 C00E      |
810 C00E      |
820 C00E      |
830 C00E      |
840 C00E      |
850 C00E      |
860 C00E      |
870 C00E      |
880 C00E      |
890 C00E      |
900 C00E      |
910 C00E      |
920 C00E      |
930 C00E      |
940 C00E      |
950 C00E      |
960 C00E      |
970 C00E      |
980 C00E      |
990 C00E      |
1000 C00E     |
1010 C00E     |
1020 C00E     |
1030 C00E     |
1040 C00E     |
1050 C00E     |
1060 C00E     |
1070 C00E     |
1080 C00E     |
1090 C00E     |
1100 C00E     |
1110 C00E     |
1120 C00E     |
1130 C00E     |
1140 C00E     |
1150 C00E     |
1160 C00E     |
1170 C00E     |
1180 C00E     |
1190 C00E     |
1200 C00E     |
1210 C00E     |
1220 C00E     |
1230 C00E     |
1240 C00E     |
1250 C00E     |
1260 C00E     |
1270 C00E     |
1280 C00E     |
1290 C00E     |
1300 C00E     |
1310 C00E     |
1320 C00E     |
1330 C00E     |
1340 C00E     |
1350 C00E     |
1360 C00E     |
1370 C00E     |
1380 C00E     |
1390 C00E     |
1400 C00E     |
1410 C00E     |
1420 C00E     |
1430 C00E     |
1440 C00E     |
1450 C00E     |
1460 C00E     |
1470 C00E     |
1480 C00E     |
1490 C00E     |
1500 C00E     |
1510 C00E     |
1520 C00E     |
1530 C00E     |
1540 C00E     |
1550 C00E     |
1560 C00E     |
1570 C00E     |
1580 C00E     |
1590 C00E     |
1600 C00E     |
1610 C00E     |
1620 C00E     |
1630 C00E     |
1640 C00E     |
1650 C00E     |
1660 C00E     |
1670 C00E     |
1680 C00E     |
1690 C00E     |
1700 C00E     |
1710 C00E     |
1720 C00E     |
1730 C00E     |
1740 C00E     |
1750 C00E     |
1760 C00E     |
1770 C00E     |
1780 C00E     |
1790 C00E     |
1800 C00E     |
1810 C00E     |
1820 C00E     |
1830 C00E     |
1840 C00E     |
1850 C00E     |
1860 C00E     |
1870 C00E     |
1880 C00E     |
1890 C00E     |
1900 C00E     |
1910 C00E     |
1920 C00E     |
1930 C00E     |
1940 C00E     |
1950 C00E     |
1960 C00E     |
1970 C00E     |
1980 C00E     |
1990 C00E     |
2000 C00E     |
2010 C00E     |
2020 C00E     |
2030 C00E     |
2040 C00E     |
2050 C00E     |
2060 C00E     |
2070 C00E     |
2080 C00E     |
2090 C00E     |
2100 C00E     |
2110 C00E     |
2120 C00E     |
2130 C00E     |
2140 C00E     |
2150 C00E     |
2160 C00E     |
2170 C00E     |
2180 C00E     |
2190 C00E     |
2200 C00E     |
2210 C00E     |
2220 C00E     |
2230 C00E     |
2240 C00E     |
2250 C00E     |
2260 C00E     |
2270 C00E     |
2280 C00E     |
2290 C00E     |
2300 C00E     |
2310 C00E     |
2320 C00E     |
2330 C00E     |
2340 C00E     |
2350 C00E     |
2360 C00E     |
2370 C00E     |
2380 C00E     |
2390 C00E     |
2400 C00E     |
2410 C00E     |
2420 C00E     |
2430 C00E     |
2440 C00E     |
2450 C00E     |
2460 C00E     |
2470 C00E     |
2480 C00E     |
2490 C00E     |
2500 C00E     |
2510 C00E     |
2520 C00E     |
2530 C00E     |
2540 C00E     |
2550 C00E     |
2560 C00E     |
2570 C00E     |
2580 C00E     |
2590 C00E     |
2600 C00E     |
2610 C00E     |
2620 C00E     |
2630 C00E     |
2640 C00E     |
2650 C00E     |
2660 C00E     |
2670 C00E     |
2680 C00E     |
2690 C00E     |
2700 C00E     |
2710 C00E     |
2720 C00E     |
2730 C00E     |
2740 C00E     |
2750 C00E     |
2760 C00E     |
2770 C00E     |
2780 C00E     |
2790 C00E     |
2800 C00E     |
2810 C00E     |
2820 C00E     |
2830 C00E     |
2840 C00E     |
2850 C00E     |
2860 C00E     |
2870 C00E     |
2880 C00E     |
2890 C00E     |
2900 C00E     |
2910 C00E     |
2920 C00E     |
2930 C00E     |
2940 C00E     |
2950 C00E     |
2960 C00E     |
2970 C00E     |
2980 C00E     |
2990 C00E     |
3000 C00E     |
3010 C00E     |
3020 C00E     |
3030 C00E     |
3040 C00E     |
3050 C00E     |
3060 C00E     |
3070 C00E     |
3080 C00E     |
3090 C00E     |
3100 C00E     |
3110 C00E     |
3120 C00E     |
3130 C00E     |
3140 C00E     |
3150 C00E     |
3160 C00E     |
3170 C00E     |
3180 C00E     |
3190 C00E     |
3200 C00E     |
3210 C00E     |
3220 C00E     |
3230 C00E     |
3240 C00E     |
3250 C00E     |
3260 C00E     |
3270 C00E     |
3280 C00E     |
3290 C00E     |
3300 C00E     |
3310 C00E     |
3320 C00E     |
3330 C00E     |
3340 C00E     |
3350 C00E     |
3360 C00E     |
3370 C00E     |
3380 C00E     |
3390 C00E     |
3400 C00E     |
3410 C00E     |
3420 C00E     |
3430 C00E     |
3440 C00E     |
3450 C00E     |
3460 C00E     |
3470 C00E     |
3480 C00E     |
3490 C00E     |
3500 C00E     |
3510 C00E     |
3520 C00E     |
3530 C00E     |
3540 C00E     |
3550 C00E     |
3560 C00E     |
3570 C00E     |
3580 C00E     |
3590 C00E     |
3600 C00E     |
3610 C00E     |
3620 C00E     |
3630 C00E     |
3640 C00E     |
3650 C00E     |
3660 C00E     |
3670 C00E     |
3680 C00E     |
3690 C00E     |
37
```

```

480 C00E      CVTSG      = $D0DF
490 C00E      GETSG      = $E487
498 C00E      DRLSTG     = $B686
500 C00E      RESWDS     = $B09E
510 C00E      QLDMMI     = $FE47
520 C00E      NMVIC      = $B318
530 C00E      PR2        = $D0D0
540 C00E      PORT       = $D0D1
550 C00E      PR2DDR     = $D0D2
560 C00E      DDR        = $D0D3
570 C00E      FLAG       = $D0DD
580 C00E      |
590 C00E      |
600 C00E      | PRINT BUFFER AREA
610 C00E      |
620 C00E      BUFFER      = #
630 C00E      M=M+256
640 C00E      |
648 C00E      |
658 C00E      |
668 C00E      |
670 C00E      |
680 C00E      | GRAPHICS/CONTROL CODES TABLE
690 C00E      |
698 C00E      93434C      CLTAB      BVT $93,'C','L','S'+$80
700 C00E      112 13484F      BVT $13,'H','O','M'+$80
708 C00E      9D43CC      BVT $D3,'C','L'+$80
710 C00E      1143D2      BVT $1D,'C','R'+$80
720 C00E      9143D5      BVT $91,'C','U'+$80
730 C00E      1143C4      BVT $11,'C','D'+$80
740 C00E      1225245      BVT $12,'R','E','V'+$80
750 C00E      924F46      BVT $92,'S','F','F'+$80
760 C00E      1203538      BVT $20,'S','P','C'+$80
770 C00E      8546B1      BVT $85,'F','4'+$80
780 C00E      9546B3      BVT $85,'F','4'+$80
790 C00E      9374E85      BVT $87,'F','4'+$80
800 C00E      8846B7      BVT $88,'F','7'+$80
810 C00E      8946B2      BVT $89,'F','2'+$80
820 C00E      8846B4      BVT $88,'F','4'+$80
830 C00E      8C46B6      BVT $8B,'F','6'+$80
840 C00E      8C46B8      BVT $8C,'F','6'+$80
850 C00E      943434      BVT $90,'C','T','L','1'+$80
860 C00E      054343      BVT $05,'C','T','L','2'+$80
870 C00E      104334      BVT $10,'C','T','L','3'+$80
880 C00E      9F43B4      BVT $9F,'C','T','L','4'+$80
890 C00E      3C4334      BVT $3C,'C','T','L','5'+$80
900 C00E      1E4334      BVT $1E,'C','T','L','6'+$80
910 C00E      1F4334      BVT $1F,'C','T','L','7'+$80
920 C00E      9E4334      BVT $9E,'C','T','L','8'+$80
930 C00E      08473E      BVT $C8,'G','T','M'+$80
940 C00E      17473E      BVT $C1,'G','T','A'+$80
950 C00E      12473E      BVT $C2,'G','T','B'+$80
960 C00E      13473E      BVT $C3,'G','T','C'+$80
970 C00E      14473E      BVT $C4,'G','T','D'+$80
980 C00E      05473E      BVT $C5,'G','T','E'+$80
990 C00E      06473E      BVT $C6,'G','T','F'+$80
1000 C00E      17473E      BVT $C7,'G','T','G'+$80
1010 C00E      08473E      BVT $C8,'G','T','H'+$80
1020 C00E      09473E      BVT $C9,'G','T','I'+$80
1030 C00E      09473E      BVT $C9,'G','T','I'+$80

```

```

1044  C19A D4473E          BVT $CB, G, /, K+580
1050  C19E D4473E          BVT $CD, G, /, M+580
1060  C1A2 D4473E          BVT $CD, G, /, M+580
1070  C1A6 E4473E          BVT $CE, G, /, N+580
1080  C1A8 F4473E          BVT $CF, G, /, O+580
1090  C1AE D4473E          BVT $D0, G, /, P+580
1100  C1B2 D4473E          BVT $D1, G, /, O+580
1110  C1B4 D4473E          BVT $D2, G, /, X+580
1120  C1B8 D3473E          BVT $D3, G, /, S+580
1130  C1BE D4473E          BVT $D4, G, /, T+580
1140  C1C2 D5473E          BVT $D5, G, /, U+580
1150  C1C6 D6473E          BVT $D6, G, /, V+580
1160  C1CA D4473E          BVT $D7, G, /, W+580
1170  C1CE D4473E          BVT $D8, G, /, X+580
1180  C1D2 D4473E          BVT $D9, G, /, Y+580
1190  C1D6 D4473E          BVT $DA, G, /, Z+580
1200  C1DA D4473E          BVT $DB, G, /, ++580
1210  C1DE D4473E          BVT $DC, G, /, --580
1220  C1E2 D4473E          BVT $DD, G, /, --580
1230  C1E4 DF473E          BVT $DF, G, /, A+580
1240  C1EA F1473E          BVT $F1, G, /, K+580
1250  C1E8 A2473E          BVT $A2, G, /, I+580
1260  C1F2 F3473E          BVT $A3, G, /, T+580
1270  C1F6 A4473E          BVT $A4, G, /, O+580
1280  C1FA A5473E          BVT $A5, G, /, G+580
1290  C1FE B6473E          BVT $A6, G, /, C+580
1300  C202 B7473E          BVT $A7, G, /, M+580
1310  C206 B8473E          BVT $A8, G, /, E+580
1320  C20A A4473E          BVT $A9, G, /, E+580
1330  C20E A8473E          BVT $AA, G, /, N+580
1340  C212 B4473E          BVT $AC, G, /, D+580
1350  C216 B8473E          BVT $AD, G, /, Z+580
1360  C21A B9473E          BVT $AE, G, /, C+580
1370  C21E AF473E          BVT $AF, G, /, F+580
1380  C222 B0473E          BVT $B0, G, /, A+580
1390  C226 B1473E          BVT $B1, G, /, E+580
1400  C22A B2473E          BVT $B2, G, /, K+580
1410  C22E B3473E          BVT $B3, G, /, C+580
1420  C232 B4473E          BVT $B4, G, /, H+580
1430  C236 B5473E          BVT $B5, G, /, J+580
1440  C23A B6473E          BVT $B6, G, /, L+580
1450  C23E B7473E          BVT $B7, G, /, Y+580
1460  C242 B8473E          BVT $B8, G, /, U+580
1470  C246 B9473E          BVT $B9, G, /, O+580
1480  C24A BA473E          BVT $BA, G, /, C+580
1490  C24E BB473E          BVT $BB, G, /, F+580
1500  C252 B0473E          BVT $BC, G, /, X+580
1510  C256 B0473E          BVT $BD, G, /, X+580
1520  C25A B8473E          BVT $BE, G, /, V+580
1530  C25E BF473E          BVT $BF, G, /, Y+580
1540  C262 00              BVT $00, /, END OF TABLE
1550  C263
1560  C263
1570  C263
1580  C263
1590  C263
1600  C263

```



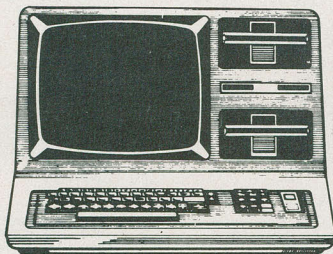

```

1610 C263 A96E BEGIN LDA #CSTART
1620 C265 BD1103 STA USR
1630 C268 A9C2 LDA #*START
1640 C26A BD1203 STA USR+1
1650 C26D 60 RTS
1660 C26E
1670 C26E MAIN PROGRAM START
1680 C26E
1690 C26E
1700 C26E 20F7B7 START JSR POSINT
1710 C271 A515 LDA #15
1720 C273 F005 BEQ GETNUM
1730 C275 A20E QTVERR LDX #00E
1740 C277 4C37A4 JMP ERROR
1750 C27A A514 GETNUM LDA #14
1760 C27C C910 CMP #010
1770 C27E 90F5 BCC QTVERR
1780 C280 BD0DC0 STA WIDTH
1790 C283
1800 C283 INITIALISE ALL POINTERS
1810 C283
1820 C283
1830 C283 A52B LDA TXTTAB
1840 C285 BD03C0 STA LNKPTR
1850 C288 A52C LDA TXTTAB+1
1860 C28A BD04C0 STA LNKPTR+1
1870 C28D A900 LDA #0
1880 C28F BD00C0 STA SPNUM
1890 C292
1900 C292 LOOP ONCE FOR EACH PROGRAM LINE
1910 C292
1920 C292
1930 C292 A900 MAINLP LDA #0
1940 C294 BD05C0 STA OUTFLG
1950 C297 BD09C0 STA BUFPTR
1960 C29A BD07C0 STA REMPLG
1970 C29D BD06C0 STA COLFLG
1980 C2A0
1990 C2A0 INITIALISE THE PRINT BUFFER
2000 C2A0
2010 C2A0
2020 C2A0 A6 TRV
2030 C2A1 990EC0 BUFINT STA BUFFER,V
2040 C2A4 C8 INY
2050 C2A5 D0FA BNE BUFINT
2060 C2A7
2070 C2A7 SET UP TXTPTR FOR THIS LINE
2080 C2A7
2090 C2A7 LDA LNKPTR
2100 C2A7 BD03C0 STA TXTPTR
2110 C2AA 85FB
2120 C2AC AD04C0 LDA LNKPTR+1
2130 C2AF 85FC STA TXTPTR+1
2140 C2B1
2150 C2B1 SET UP LNKPTR FOR NEXT LINE
2160 C2B1
2170 C2B1 LDA (TXTPTR),Y
2180 C2B1 B1FB STA LNKPTR
2190 C2B3 BD03C0 INY
2200 C2B6 C8 LDA (TXTPTR),Y
2210 C2B7 B1FB STA LNKPTR+1
2220 C2B9 BD04C0 STA LNKPTR+1
2230 C2BC
2240 C2BC IF HIGH POINTER BYTE IS NULL
2250 C2BC THEN END OF PROGRAM REACHED
2260 C2BC
2270 C2BC CMP #0
2280 C2BC BNE LIST
2290 C2BE D009 LDA #0
2300 C2C0 A900 STA FPA1
2310 C2C2 9561 STA TYPE
2320 C2C4 850D STA NMTYPE
2330 C2C6 950E RTS
2340 C2C8 60
2350 C2CA GET LINE NUMBER AND PRINT IT
2360 C2CB LIST
2370 C2CB INY
2380 C2CB LDA (TXTPTR),Y
2390 C2CB STA FPA1+2
2400 C2CC B1FB INY
2410 C2CE C8 LDA (TXTPTR),Y
2420 C2CF B1FB STA FPA1+1
2430 C2D1 8562 TRV
2440 C2D3 90 TPA
2450 C2D5 208EC4 PHA
2460 C2D7 48 JSR CVTNUM
2470 C2D9 48 PHA
2480 C2DB 48 TRV
2490 C2DD 48 LDA #*20
2500 C2DE 48 LDA #*05
2510 C2DF 48 BEQ SPEND
2520 C2E0 208AC4 JSR PRINT
2530 C2E2 E3 INX
2540 C2E3 E3 SEC
2550 C2E4 38 BCS SPCLP
2560 C2E5 80F3 PLA
2570 C2E7 68 TAX
2580 C2E8 4A JSR PRNTNUM
2590 C2E9 209EC4
2600 C2EC
2610 C2EC ADD IN FOR/NEXT INDENT
2620 C2EC
2630 C2EC
2640 C2EC LDX SPNUM
2650 C2EF F00A BEQ NOSPC
2660 C2F1 A920 LDA #*20
2670 C2F3 48 PHA
2680 C2F4 208AC4 JSR PRINT
2690 C2F7 68 PLA
2700 C2F8 CA JEX
2710 C2F9 D0F8 BNE SPCLP
2720 C2FB 68 PLA
2730 C2FC AB TRV
2740 C2FD
2750 C2FD LOOP FOR EACH BYTE IN THE LINE
2760 C2FD
2770 C2FD LINELP INY
2780 C2FD C8 LDA (TXTPTR),Y
2790 C2FE B1FB BNE NOTNUL
2800 C300 D006
2810 C302
2820 C302 END OF LINE FOUND - SO PRINT IT
2830 C302
2840 C302 JSR PRTOU
2850 C302 208EC4 SEC
2860 C305 32 BCS MAINLP
2870 C306 B08A
2880 C308
2890 C308 NOT END OF LINE
2900 C308
2910 C308
2920 C308 AD05C0 NOTNUL LDA OUTFLG
2930 C30B F003 BEQ QTOFF
2940 C30D 4C8C3 JMP QTOON
2950 C310
2960 C310
2970 C310 NOT A STRING, SO CHECK FOR TOKENS
2980 C310
2990 C310 B1FB QTOFF LDA (TXTPTR),Y
3000 C312 48 PHA
3010 C313 2980 AND #*20
3020 C315 F054 BEQ NOTOK
3030 C317
3040 C317 CHARACTER IS A KEYWORD TOKEN
3050 C317
3060 C317 PLA
3070 C317 68 CMP #*0A
3080 C318 C9AA BCS OPRTOR
3090 C31A B049 PHA
3100 C31C 48
3110 C31D
3120 C31D IF IT IS A 'FOR' THEN INDENT
3130 C31D

```

TRS-80* SOFTWARE

Write for our incredible catalogue of over 130 pages, containing hundreds of programs for the Model I, III, 4, and Colour Computer. Catalogue is \$5.00 refundable on your first order. All software is unconditionally guaranteed for life!! Canadian manufacturer and distributor for Molimex Ltd. of England.



*Trademark of Tandy Corporation.

Please state spec's and model of your computer.

GAMES/DOS/UTILITIES/BUSINESS PROGRAMS

LDOS	\$ 99.95	ENIGMA (Game)	\$ 25.95
MULTIDOS	\$129.95	TYPEITALL (Word Processor) ..	\$ 90.95
ACCEL 4 (Basic Compiler) ..	\$ 97.95	DC-10 (Flight Simulator)	\$ 25.95
JUMBO (Flight Simulator) ..	\$ 28.95	EDAS (Editor/Assembler)	\$139.95
POWERMAIL PLUS	\$199.95	HARTFORTH	\$ 90.95
AIRBUS (Flight Simulator) ..	\$ 29.95	PASCAL	\$132.95
DRIVER COMPILER	\$ 29.95	DSMBLR 3 (Disassembler)	\$ 54.95

FULLY SUPPORTED COMPUTER SOFTWARE

THIS MONTH'S SPECIALS

INCTAX '84 calculates your personal Income Tax for 1984 Tax

File, Model I/III tape or disk (includes Quebec) \$69.95
Yearly updates \$35.00

THESE SPECIALS ARE OVER AT THE END OF THIS MONTH!

JSOFT LTD.

P.O. Box 1437, WINNIPEG, Manitoba R3C 2Z4
(204) 943-6916 CANADA DEALERS WELCOME

Circle No. 19 on Reader Service Card

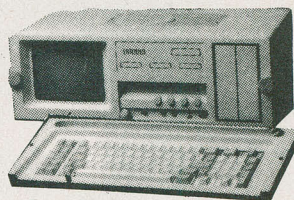
P.C. Compatible



ECS1-PC
\$1295.00

- 8088 processor • optional Intel 8087 numeric coprocessor • 64K memory exp. to 256K • double sided double density disk drive • detachable keyboard • colour-graphic board • 100 watt power supply • support PC software • 90 day warranty

ECS6 Portable Introductory Offer \$1195.00



- Dual Processors 6502 and Z80
- 64K Ram Controller Card
- Hi-Res 9" Amber Monitor
- Detachable Keyboard with Special Functions.
- Disk Drive
- 90 Day Warranty

NOW OPEN

ECS

ELECTRONIC CONTROL SYSTEMS
1590 Matheson Boulevard, Suite 1 & 2 Mississauga, Ontario L4W 1J1
(416) 625-8036 Hours — Mon. to Fri. 10-6. Sat. 10-2

Circle No. 17 on Reader Service Card

ECS4 Systems

~~\$1179.00~~
Special
\$995.00



- dual processor 6502 and Z80 • 64K RAM • controller card • disk drive • Hi-res 11" amber monitor • colour graphics • detachable keyboard with special function • 90 days warranty.

XT/PC MAIN BOARD \$375.00

- PC Compatible bare Board \$ 39.00
- Multi function card \$175.00
- PC Compt. Case \$ 79.00
- PC Compt. Power Supply 15 amps 130 watts \$139.00
- PC, Half height Hitachi Drive D.S.D.D. \$219.00

DISK DRIVE \$219.00

- Apple II Compatible Shugart 390L \$249.00
- Slim Line Teac \$ 49.00
- Z80 \$ 55.00
- 16K Ram \$ 45.00
- Disk Controller \$ 69.00
- 80 Column \$199.00
- Light Pen \$ 38.00
- Joy Stick \$ 79.00
- 5 Amps Power Supply \$ 79.00
- Modem, Auto Dial, Auto Answer \$159.00

67

Commodore List Debugger

```

3140 C31D      !
3150 C31D C981      CMP #881
3160 C31F D00C      BNE CHKNXT
3170 C321 A904      LDA #804
3180 C323 18        CLC
3190 C324 6D0CC0     ADC SPCNUM
3200 C327 8D0CC0     STA SPCNUM
3210 C32A 38        SEC
3220 C32B B01D      BCS PRKEY
3230 C32D          !
3240 C32D          !
3250 C32D          !
3260 C32D          !
3270 C32D C982      CHKNXT      CMP #882
3280 C32F D010      BNE CHKREM
3290 C331 8D0CC0     LDA SPCNUM
3300 C334 38        SEC
3310 C335 E904      SBC #804
3320 C337 B002      BCS SETSPC
3330 C339 A900      LDA #800
3340 C33B 8D0CC0     STA SPCNUM
3350 C33E 38        SEC
3360 C33F B009      BCS PRKEY
3370 C341          !
3380 C341          !
3390 C341          !
3400 C341          !
3410 C341 C98F      CHKREM      CMP #88F
3420 C343 D005      BNE PRKEY
3430 C345 89FF      LDA #8FF
3440 C347 8D07C0     STA REMFLG
3450 C34A          !
3460 C34A          !
3470 C34A          !
3480 C34A          !
3490 C34A 8D06C0     PRKEY      LDA COLFLG
3500 C34D D005      BNE COLFND
3510 C34F 8920      LDA #820
3520 C351 20ARC4     JSR PRINT
3530 C354 A900      COLFND      LDA #800
3540 C356 8D06C0     STA COLFLG
3550 C359 68        PLA
3560 C35A 2051C4     JSR SRTTOK
3570 C35D 8920      LDA #820
3580 C35F 20ARC4     JSR PRINT
3590 C362 38        SEC
3600 C363 B098      BCS LINELP
3610 C365          !
3620 C365          !
3630 C365          !
3640 C365          !
3650 C365 2051C4     OPTOR      JSR SRTTOK
3660 C368 38        SEC
3670 C369 B092      BCS LINELP
3680 C36B          !
3690 C36B          !
3700 C36B          !
3710 C36B          !
3720 C36B 68        NOTTOK      PLA
3730 C36C C920      CMP #820
3740 C36E D00A      BNE NOTSPC
3750 C370 8D07C0     LDA REMFLG
3760 C373 F088      BEO LINELP
3770 C375 8920      LDA #820
3780 C377 38        SEC
3790 C378 B028      BCS PRCHR
3800 C37A          !
3810 C37A          !
3820 C37A          !
3830 C37A          !
3840 C37A C922      NOTSP2     CMP #822
3850 C37C D00B      BNE TSTCOL
3860 C37E 20ARC4     JSR PRINT
3870 C381 89FF      LDA #8FF
3880 C383 8D05C0     STA OUTFLG
3890 C386 4CFDC2     JMP LINELP
3900 C389          !
3910 C389          !
3920 C389          !
3930 C389          !
3940 C389 C93A      TSTCOL      CMP #83A
3950 C38B D015      BNE PRCHR
3960 C38D 20ARC4     JSR PRINT
3970 C38F 8D07C0     LDA REMFLG
3980 C393 D00A      BNE COLEND
3990 C395 8920      LDA #820
4000 C397 20ARC4     JSR PRINT
4010 C39A 89FF      LDA #8FF
4020 C39C 8D06C0     STA COLFLG
4030 C39F 4CFDC2     COLEND      JMP LINELP
4040 C3A2          !
4050 C3A2          !
4060 C3A2          !
4070 C3A2          !
4080 C3A2 20ARC4     PRCHR      JSR PRINT
4090 C3A5 4CFDC2     JMP LINELP
4100 C3A8          !
4110 C3A8          !
4120 C3A8          !
4130 C3A8          !
4140 C3A8          !
4150 C3A8 B1FB      QUOTON      LDA (TXTPTR),Y
4160 C3AA C922      CMP #822
4170 C3AC D00B      BNE NOTQOT
4180 C3AE 20ARC4     JSR PRINT
4190 C3B1 A900      LDA #800
4200 C3B3 8D05C0     STA OUTFLG
4210 C3B6 4CFDC2     JMP LINELP
4220 C3B9          !
4230 C3B9          !
4240 C3B9          !
4250 C3B9          !
4260 C3B9 C921      NOTQOT      CMP #821
4270 C3BB 900A      BCC CTLCOD
4280 C3BD C980      CMP #880
4290 C3BF B006      BCS CTLCOD
4300 C3C1 20ARC4     JSR PRINT
4310 C3C4 4CFDC2     JMP LINELP
4320 C3C7          !
4330 C3C7          !
4340 C3C7          !
4350 C3C7          !
4360 C3C7 8D06C0     CTLCOD      STA CTLCCHR
4370 C3CA A201      LDX #801

4380 C3CC          !
4390 C3CC          !
4400 C3CC          !
4410 C3CC          !
4420 C3CC C8        NUMLP      INY
4430 C3CD B1FB      LDA (TXTPTR),Y
4440 C3CF D08C0     CMP CTLCCHR
4450 C3D2 D0B3      BNE SCHTAB
4460 C3D4 E8        JHX
4470 C3D5 D0F5      BNE NUMLP
4480 C3D7 8E0BC0     SCHTAB      STX NUMCHR
4490 C3DA 88        DEV
4500 C3DD 38        TYA
4510 C3DD 48        PHA
4520 C3DD          !
4530 C3DD          !
4540 C3DD          !
4550 C3DD          !
4560 C3DD A90E      LDA #C0TLAB
4570 C3DF 85FD      STA TABPTR
4580 C3E1 A9C1      LDA #C0TLAB
4590 C3E3 85FE      STA TABPTR+1
4600 C3E5 A000      LDX #800
4610 C3E7 B1FD      CTLLP      LDA (TABPTR),Y
4620 C3E9 F053      BEO NOTIN
4630 C3EB D08C0     CMP CTLCCHR
4640 C3EE F0F8      BEO CHRFND
4650 C3F0          !
4660 C3F0          !
4670 C3F0          !
4680 C3F0          !
4690 C3F0 2037C4     STEPON      JSR INCPTR
4700 C3F3 B1FD      LDA (TABPTR),Y
4710 C3F5 2900      AND #880
4720 C3F7 F0F7      BEO STEPON
4730 C3F9 2037C4     JSR INCPTR
4740 C3FC 38        SEC
4750 C3FD B0E8      BCS CTLLP
4760 C3FF          !
4770 C3FF          !
4780 C3FF          !
4790 C3FF          !
4800 C3FF 2037C4     CHRFND      JSR INCPTR
4810 C402 895B      LDA #C
4820 C404 20ARC4     JSR PRINT
4830 C407          !
4840 C407          !
4850 C407          !
4860 C407          !
4870 C407 8D0BC0     LDA NUMCHR
4880 C40A C901      CMP #801
4890 C40C F0D0      BEO PRTCOD
4900 C40E 85C3      STA FPA1+2
4910 C410 8900      LDA #800
4920 C412 8562      STA FPA1+1
4930 C414 20BEC4     JSR CVTNUM
4940 C417 8A        TAX
4950 C418 20BEC4     JSR PRTHUM
4960 C41B          !
4970 C41B          !
4980 C41B          !
4990 C41B          !
5000 C41B A000      PRTCOD      LDX #800
5010 C41D B1FD      LDA (TABPTR),Y
5020 C41F 2037C4     JSR INCPTR
5030 C422 48        PHA
5040 C423 297F      AND #87F
5050 C425 20ARC4     JSR PRINT
5060 C428 68        PLA
5070 C429 2900      AND #880
5080 C42B F0EE      BEO PRTCOD
5090 C42D 895D      LDA #C
5100 C42F 20ARC4     JSR PRINT
5110 C432 68        PLA
5120 C433 8A        TAX
5130 C434 4CFDC2     JMP LINELP
5140 C437          !
5150 C437          !
5160 C437          !
5170 C437          !
5180 C437 85FD      INCPT      INCPT      INCPT
5190 C439 D0B2      BNE INCEND
5200 C43B 85FE      INC TABPTR+1
5210 C43D C0        RTS
5220 C43E          !
5230 C43E          !
5240 C43E          !
5250 C43E          !
5260 C43E 8E0BC0     NOTIN      LDX NUMCHR
5270 C441 8D0BC0     LDA CTLCCHR
5280 C444 48        PHA
5290 C445 20ARC4     JSR PRINT
5300 C448 68        PLA
5310 C449 8A        DEX
5320 C44A D0F8      BNE NILOOP
5330 C44C 68        PLA
5340 C44D 8A        TAX
5350 C44E 4CFBC2     JMP LINELP
5360 C451          !
5370 C451          !
5380 C451          !
5390 C451          !
5400 C451 8A        SRITOK      TAX
5410 C452 98        TYA
5420 C453 48        PHA
5430 C454 8A        TAX
5440 C455          !
5450 C455          !
5460 C455          !
5470 C455          !
5480 C455 C9FF      CMP #8FF
5490 C457 D0B0      BNE NOTPI
5500 C459 895B      LDA #P
5510 C45B 20ARC4     JSR PRINT
5520 C45E 8949      LDA #P
5530 C460 20ARC4     JSR PRINT
5540 C463 68        PLA
5550 C464 8A        TAX
5560 C465 68        RTS
5570 C466          !
5580 C466          !
5590 C466          !
5600 C466          !
5610 C466 38        NOTPI      SEC
5620 C467 E97F      SBC #87F

5630 C469 8A        TAX
5640 C46A 8A        DEX
5650 C46B          !
5660 C46B          !
5670 C46B          !
5680 C46B          !
5690 C46B          !
5700 C46B 8000      LDY #800
5710 C46D 20B5C4     JSR SCHWRD
5720 C470 8A        DEX
5730 C471 D0FA      BNE KWDLP1
5740 C473          !
5750 C473          !
5760 C473          !
5770 C473 899E00     KWDLP2      LDA RESWDS,Y
5780 C476 C8        INY
5790 C477 48        PHA
5800 C485          !
5810 C485          !
5820 C485          !
5830 C485          !
5840 C485          !
5850 C485          !
5860 C485          !
5870 C485          !
5880 C485          !
5890 C485          !
5900 C485          !
5910 C485          !
5920 C485          !
5930 C485 899E00     SCHWRD      LDA RESWDS,Y
5940 C488 C8        INY
5950 C489 2900      AND #880
5960 C48B F0F8      BEO SCHWRD
5970 C48D 60        RTS
5980 C48E          !
5990 C48E          !
6000 C48E          !
6010 C48E          !
6020 C48E          !
6030 C48E A290      CVTNUM      LDX #890
6040 C490 38        SEC
6050 C491 2049BC     JSR PADOUT
6060 C494 20DFD0     JSR CVTSTG
6070 C497 20B7B4     JSR GETSTG
6080 C49A 20A6B6     JSR DALSTG
6090 C49D 60        RTS
6100 C49E          !
6110 C49E          !
6120 C49E          !
6130 C49E          !
6140 C49E 8A00      PRTHUM      LDY #800
6150 C4A0 B122      CPVLP      LDA ($22),Y
6160 C4A2 20ARC4     JSR PRINT
6170 C4A5 C8        INY
6180 C4A6 C8        INY
6190 C4A7 D0F7      BNE CPVLP
6200 C4A9 60        RTS
6210 C4AA          !
6220 C4AA          !
6230 C4AA          !
6240 C4AA          !
6250 C4AA 8D0BC0     PRINT      STA CTLCCHR
6260 C4AD 38        TYA
6270 C4AE 48        PHA
6280 C4AF AC09C0     LDY BUFPTR
6290 C4B2 E09C0C     INC BUFPTR
6300 C4B5 8D0BC0     LDA CTLCCHR
6310 C4B8 990EC0     STA BUFPTR,Y
6320 C4BB 68        PLA
6330 C4BC 8A        TAX
6340 C4BD 60        RTS
6350 C4BE          !
6360 C4BE          !
6370 C4BE          !
6380 C4BE          !
6390 C4BE AC09C0     PRTHUM      LDY BUFPTR
6400 C4C1 A981      LDA #801
6410 C4C3 990EC0     STA BUFPTR,Y
6420 C4C6 8D0BC0     LDA WIDTH
6430 C4C9 8D0BC0     STA LINLEN
6440 C4CC          !
6450 C4CC          !
6460 C4CC          !
6470 C4CC          !
6480 C4CC A20F      LINEHD      LDX #WORD
6490 C4CE AC09C0     LDY LINLEN
6500 C4D1 B90FC0     SPCLP1      LDA BUFPTR+1,Y
6510 C4D4 F0B4      BEO PRBUF
6520 C4D6 C90D      CMP #80D
6530 C4D8 D003      BNE SPCLP2
6540 C4DA 4C5AC5     PRBUF      JMP OUTPUT
6550 C4DD          !
6560 C4DD          !
6570 C4DD          !
6580 C4DD          !
6590 C4DD B90EC0     SPCLP2      LDA BUFPTR,Y
6600 C4E0 C920      CMP #820
6610 C4E2 F010      BEO SPCFND
6620 C4E4 C938      CMP #838
6630 C4E6 F008      BEO BRKFND
6640 C4E8 8A        DEX
6650 C4EA 8A        DEX
6660 C4EC D0F1      BNE SPCLP2
6670 C4ED          !
6680 C4ED          !
6690 C4ED          !
6700 C4ED          !
6710 C4ED AC09C0     LDY LINLEN
6720 C4EF C8        INY
6730 C4F0          !
6740 C4F0          !
6750 C4F0          !
6760 C4F0          !
6770 C4F0 A207      BRKFND      LDX #807
6780 C4F2 D0B2      BNE MOVBYT
6790 C4F4          !
6800 C4F4          !
6810 C4F4          !
6820 C4F4          !
6830 C4F4 A206     SPCFND      LDX #806
6840 C4F6          !
6850 C4F6          !
6860 C4F6          !
6870 C4F6          !
6880 C4F6 18        MOVBYT      CLC
6890 C4F7 8D0BC0     LDA SPCNUM
6900 C4FA 690E      ADC #C0BUFR
6910 C4FC 85FD      STA BUFOFF
6920 C4FE A900      LDA #800
6930 C500 690C      ADC #C0BUFR
6940 C502 85FE      STA BUFOFF+1
6950 C504 18        CLC

```

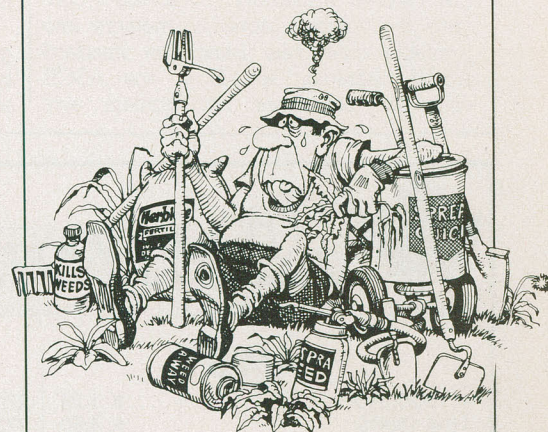


```

6960 C505 8A      TXA
6970 C506 65FD    ADC BUFOFF
6980 C508 95FD    STA BUFOFF
6990 C50A A900    LDA #A0
7000 C50C 65FE    ADC BUFOFF+1
7010 C50E 85FE    STA BUFOFF+1
7020 C510 8C08C0  STY CTLCHR
7030 C512
7040 C513
7050 C513         FIND END OF LINE IN BUFFER
7060 C513
7070 C513 A201    LDX #A01
7080 C515 C8      INY
7090 C516 B90EC0  LCL00P LDA BUFFER,Y
7100 C519 C90D    CMP #A0D
7110 C51B F005    BEQ ENDFND
7120 C51D C8      INY
7130 C51E E8      INX
7140 C51F 38      SEC
7150 C520 B0F4    BCS LCL00P
7160 C522 8A      ENDFND TXA
7170 C523 18      CLC
7180 C524 6D08C0  ADC CTLCHR
7190 C527 A8      TRY
7200 C528 E8      INX
7210 C529
7220 C529         OPEN UP A GAP
7230 C529
7240 C529
7250 C529 B90EC0  MOVLEP LDA BUFFER,Y
7260 C52C 91FD    STA (BUFOFF),Y
7270 C52E 85      DEY
7280 C52F CA      DEX
7290 C530 D0F7    BNE MOVLEP
7300 C532
7310 C532
7320 C532         PUT C/R AND SPACES IN BUFFER
7330 C532
7340 C532 AC08C0  LDY CTLCHR
7350 C535 A90D    LDA #A0D
7360 C537 990EC0  STA BUFFER,Y
7370 C53A C8      INY
7380 C53B 18      CLC
7390 C53C AD0CC0  LDA SPCHNUM
7400 C53F 6306    ADC #A06
7410 C541 AA      TXA
7420 C542 A920    LDA #A20
7430 C544 990EC0  FILLP STA BUFFER,Y
7440 C547 C8      INY
7450 C548 CA      DEX

7460 C549 D0F9    BNE FILLP
7470 C54B
7480 C54E
7490 C54E         UPDATE LINLEN FOR NEXT LINE
7500 C54B
7510 C54B 38      SEC
7520 C54C 38      SBC SPCHNUM
7530 C54D ED0CC0  CLC
7540 C550 18      ADC WIDTH
7550 C551 6D0DC0  STA LINLEN
7560 C554 8D0AC0  JMP LINEND
7570 C557 4CCCC4
7580 C55A
7590 C55A
7600 C55A         PRINTER ROUTINE (CENTRONICS)
7610 C55A         FIRST INITIALISE THE USER PORT
7620 C55A
7630 C55A A200    OUTPUT LDX #A00
7640 C55C 86FD    STX BUSY
7650 C55E 8E01DD  STX PORT
7660 C561 AD00DD  LDA PA2
7670 C564 0904    ORA #A04
7680 C566 8D00DD  STA PA2
7690 C569 A2FF    LDX #AFF
7700 C56B BE03DD  STX DDR
7710 C56E AD02DD  LDA PA2DDR
7720 C571 0904    ORA #A04
7730 C573 8D02DD  STA PA2DDR
7740 C576 A000    LDY #A00
7750 C578
7760 C578
7770 C578         NOW OUTPUT THE CHARACTER
7780 C578
7790 C578 B90EC0  OUTLP LDA BUFFER,Y
7800 C57B F020    BEQ OUTEND
7810 C57D 8D01DD  STA PORT
7820 C580 AD00DD  LDA PA2
7830 C583 29F8    AND #A0F8
7840 C585 8D00DD  STA PA2
7850 C588 A2B2    LDX #A0B2
7860 C58A CA      DEX
7870 C58B D0FD    BNE DELVLP
7880 C58D 0904    ORA #A04
7890 C58F 8D00DD  STA PA2
7900 C592 AD00DD  LDA FLAG
7910 C595 2910    AND #A010
7920 C597 F0F9    BEQ FLAGLFP
7930 C599 C8      INY
7940 C59A 38      SEC
7950 C59B 8D0B    MCS OUTLP
7960 C59D 68      RTS

```



OVERLEA TECHNICAL SERVICES

Moorshead Publications has the capacity to serve you economically in two areas of expertise:

TECHNICAL WRITING: The combination of technical understanding, literary ability, and a grasp of the reader's needs can be a rare talent indeed. Our writers have extensive experience at writing documentation and articles for both technical and non-technical audiences.

PRODUCT PHOTOGRAPHY: Studio photography with small or large format cameras, in either colour or black-and-white, can show your product in its most appealing way. Various sets and backgrounds can be arranged, as well as special processing effects through professional colour labs.

If you cannot support full-time employees for these services, or you just need to reduce the workload, contact us at the address shown below:

William Markwick
Overlea Technical Services
 A Division of Moorshead Publications
 25 Overlea Blvd.
 Toronto, Ontario M4H 1B1
 (416) 423-3262

ENTER THE AGE OF INTERACTIVE LASERDISC TECHNOLOGY

\$2,199.—

LASERDISC STARTER PACKAGE
 FOR THE APPLE II, IIe

Includes:

- * Pioneer™ LD-V4000 laserdisc player
- * Laser write™ authoring software
- * VAI II, computer/videodisc interface
- * Video Vision™ Space Archive disc

ALSO, INTERFACES AND COMPLETE SYSTEMS FOR THE IBM™ PC

3WMC is a Distributor of Visage™ Laserdisc hardware and software accessories for the IBM™ PC.

3rd Wave Media, a wholly owned Canadian company, offers the complete range of products and services for the planning, development, implementation, and operation of interactive laserdisc technology.



Sales + Marketing Dept.
 3rd Wave Media Consultants Ltd.
 1600 Notre Dame O., Suite 206
 Montreal, Quebec, H3J 1M1
 (514) 932-9885

Apple is a trademark of Apple Computer, Inc.
 Visage is a trademark of Visage, Inc.

Video Vision and Laser write are trademarks of Video Vision and Laser write.

Visage is a trademark of Visage, Inc.

IBM is a trademark of International Business Machines Corp.

Circle No. 18 on Reader Service Card

Commodore List Debugger

Shoot the Printer

When you type LIST, the BASIC editor inside the ROM starts printing the BASIC program stored in memory. To do this it converts the numbers stored in memory into printable characters using the standard ASCII character set. Now, the ASCII character set does not contain any

characters for cursor control, so the Commodore 64 prints graphics characters to indicate where cursor control characters exist.

This routine, then, converts these graphics characters to more intelligible symbols. All the graphics, control and cursor codes are expanded into a standard

format. The routine doesn't split words at the end of a physical line. That is, if there is insufficient space on the line for the next word, the routine generates a new line.

In addition to this, FOR NEXT loops are be indented for as many levels as is necessary. The line numbers are right justified on a five character field so that every line starts in the same place. All the keywords are preceded and followed by a single space, so that compacted lines get expanded. Likewise, colons used as statement separators are followed by a single space.

But wait... there's more. The maximum line width is adjustable without affecting any of the other features. Finally, the routine is capable of driving the standard Commodore printer or a Centronics printer connected to the user port.

The actual mythical creation that performs these wonders is a routine called COTEL. I actually wrote two very similar routines, one for the serial printer and one for a Centronics printer.

Inside Those Bytes

As I mentioned above, there are two similar routines, COTEL.SER and COTEL.CEN. Both are included here, but I will stick to describing the serial version. The important bits are the same anyway... it's only the printer drivers that vary.

In outline the routine works as follows.

Each physical line in the program is examined in turn until the end of the program is reached. As each line is scanned it is copied into an output buffer before being printed, including any extra spaces needed for FOR NEXT indentation and so on. Each keyword token is tested to see if it is either FOR or NEXT. If it is the appropriate number of spaces is added or subtracted from the current indentation.

Each character within a quoted string is tested to see if it is one of the graphic, control or cursor codes by comparing it with a table of these codes. If it is the appropriate standard code is written into the output buffer.

When the end of a line has been reached, the output buffer is scanned and carriage return characters and the appropriate number of spaces are inserted to accommodate the selected printer line width. Having been completely formatted the output buffer's contents are sent to the appropriate port to be printed.

When the output buffer has been completely printed it is cleared and the next program line is scanned. When the end of the program has been reached control is returned to BASIC.

CNI



Kitstronic

Service Centre and Retail Outlet. 4051 Sheppard Ave., East, Agincourt, Ontario M1S 1S8

INTERNATIONAL LTD.

(416) 298-3280

Telex - 065-26150

RAM'S

4116-200NS	\$ 1.35
4164-150NS	\$ 4.50
41256-150NS	\$25.00

STATIC RAM'S

2114 200NS	\$ 1.85
2016, 2116, 4016	\$ 7.00
6116P 150NS	\$ 7.00
HM6264 LP-15	\$38.00
5514AP-2	\$ 4.50
4416, 120NS 4K X 16	\$ 9.00
6264 LP-15	\$38.00
5514 AP-3	\$ 4.50

8088 SYSTEM 75/SET

(8088, 8237A-5, 8255A-5, 8259A-5,
8284, 8288D) 7 Chip Set

DX85



DX38



\$19.95

DX85 5-1/4 Floppy Disk Case
(storage up to 150 diskettes)
Lock included \$ 24.95
5A Hydro approved Switching
Power Supply (for Apple) \$79.00
15A, 130W Switching Power
Supply for IBM PCB's
Japan \$169.00

Apple Compatible Peripherals

a) 128K RAM Card	\$150.00
b) 16K RAM Card	\$ 49.00
c) 80 Column Card	\$ 69.00
d) Disk Controller Card	\$ 49.00
e) Z80 Card	\$ 49.00
f) Communication Card	\$ 79.00
g) 40/80 Col. soft switch	\$ 19.95

EPROM'S

2716-450NS	\$ 4.99
2732 450NS	\$ 6.99
2732A	\$ 7.99
2764 250NS	\$ 9.50
27128 300NS	\$18.75
27128 250NS	\$20.95
2532 450NS	\$ 7.25

CPU

6502	\$ 5.50
6502A	\$ 5.75
6522	\$ 6.99
6845	\$10.95
8035	\$11.00
8039	\$12.50
8279	\$ 9.00
8085A	\$12.50
8086	\$19.95
8088	\$16.00
UPD765	\$14.00

DISK DRIVE

IBM Compatible
Panasonic JA551-2
(same as Shugart SA455) \$185.00

XT PC PERIPHERALS

a) Super XT Main Board (No ROM)	\$420.00
b) 512K RAM Card (OK)	\$139.00
c) Multifunction Card (OK)	
AST Compatible	\$399.00
d) Monochrome Card	\$170.00
e) Monochrome Graphic Card ...	\$299.00
f) Disk Drive Card	\$119.00
g) RS-232 Card	\$119.00
h) Printer Card	\$ 69.00
i) Game I/O Card	\$ 69.00
IC Socket (Double Side)	2¢/Pin
28 pin Double Side	10 for .30 ea.

TRANSISTOR

2N3904 — .18 ea. 10 — .15 ea.
2N3906 — .22 ea 10 — .20 ea.

Mail Orders: Send a certified cheque or money order plus \$4.00 for shipping and handling. For Special Delivery, please add \$1.00 extra. Ontario residents add 7% P.S.T. Visa & Master card accepted.

While CP/M is a wonderful thing in its own right, the Apple computer can also, and usually does, operate under DOS. For this reason, there's a multitude of programs available for it. Below, we offer a mini-multitude of our own.

The following programs will operate on any Apple II+, IIe, IIc, or true compatible operating under DOS 3.3. Apple users operating only under ProDOS may have to make alterations to some programs.

Almost Free Apple DOS Software #1

Picture Coder: All Apple HiRes pictures take up 36 sectors in their binary form. This program creates a textfile of a program in memory, squeezing out the zero bytes, that can later be EXEC'd into memory. The textfile often takes up less room on the disk.

DNA Tutorial: Operating under Integer BASIC, this program might appeal to 'clone' owners. In actuality, though, it's an interactive low-res graphics tutorial of DNA in its inherent forms. And you thought your Apple was only good for games...

Toad: Speaking of games, this program is an Applesoft BASIC implementation of 'Frogger' that can be controlled with either a joystick or the keyboard. The user's high scores are saved to disk.

Function Plotter: A fairly extensive Applesoft BASIC program that takes any inputted function and plots it on the HiRes Screen.

Data Disk Formatter: Apple DOS disks need not be bootable to be useful. This binary program formats a disk without setting DOS on the tracks, conserving useful disk space.

BASIC Trace: A program for the advanced Applesoft programmer, this file, when EXEC'd, displays the hexadecimal locations of each Applesoft line number of a program in memory.

Gemini Utility: A word processor pre-boot for Gemini printer users, this BASIC program initialises the printer's font or pitch before you boot your word processor.

Payments: This BASIC program allows you to keep track of payments and credits to and from up to 100 accounts on a single disk. A sample account is included.

Databox: A small but useful database program in Applesoft BASIC. Sample files are included to get you started.

Nullspace Invaders: A quick BASIC HiRes game testing coordination and judgement as you manipulate a monolith through mysterious gates.

Fine Print: The majority of this software has been obtained from on-line public access sources, and is therefore believed to be in the public domain. Any remaining programs were written in-house. The prices of the disks defer the cost of collecting the programs, debugging them, reproducing and mailing them, plus the cost of the media they're supplied on. The software itself is offered without charge.

Moorshead Publications warrants that the software is readable, and if there are any defects in the medium, we will replace it free of charge. While considerable effort has been made to ensure that the programs have been thoroughly debugged, we are unable to assist you in adapting them for your own applications.

Almost Free Apple DOS Software #2

Amort: A monthly amortization program that calculates monthly payments to an inputted figure, calculates principle, interest on every balance, and prints out the resulting chart.

Voiceprint: An unusual program that uses the HiRes screen to sample sounds inputted through the cassette jacks at the back of your Apple. Sampling rate and other variables can be controlled, and two sounds may be compared side-by-side.

Calc NOW! Written in BASIC, this spreadsheet program is somewhat slower than VisiCalc, but still offers the power you expect from a spreadsheet. With sample files.

Cavern Crusader: A mix of BASIC and binary programming, winning this HiRes game is difficult, to say the least. For every wave of aliens shot in the cavern, there's always a meaner bunch in the wings.

Newcout: With source file. This binary program replaces the I/O hooks in the Apple with its own so you can operate your Apple through the HiRes screen. Comes with a character set.

Charset Editor: A utility to help you create your own character sets to use with Newcout.

Calendar: A BASIC utility useful for finding a particular day of any inputted month and year, or for printing out any given year.

LCLODR: With source. This binary utility BLOADs any given file into the 16K language card space at \$D000. The source is useful in showing how to use DOS commands through assembly language.

Cristo Rey: An animated HiRes BASIC program showing Cristo Rey, by moonlight. For apartment-bound romantics.

ATOT: That's an acronym for 'Applesoft to Text'. EXEC this textfile to produce a textfile of your program.

Applesoft Deflator: This program takes a textfile made by ATOT and squeezes it, replacing PRINT statements with '?' and removing unnecessary spaces from the listing.

Almost Free Apple DOS Software #3

General Ledger: A fairly massive BASIC General Ledger program. This program creates a number of files, so it's best put on a separate disk before implemented.

EE-Design: A shape design aid program written in BASIC. Allows the user to plot shapes in HiRes and either save them to disk or print them out.

Quickzap: A disk sector utility that reads a given track and sector into memory and allows you to alter it, and optionally write it back to disk.

Softgraph: A complete graphing program written in both Applesoft and binary that enables you to see your data done up professionally in pie, line or bar charts.

IntelliCalc: An intelligent calculator with three memories and a 'paper tape' readout. Data may be inserted at any point.

Poker! An Applesoft BASIC implementation of the game that has ruined many a marriage. Fortunately, you can afford to lose your electronic paycheck to you Apple... for now.

Polar Graphics: Similar in some ways to Function Plotter, this Applesoft program supplies a number of attractive functions in REM statements that you may utilize to plot out on the HiRes screen.

Clock and Clock II: Two Applesoft digital clocks. When your Apple's doing nothing better, it can now remind you of the time you're wasting. One has an alarm function.

Flowers: With source. A binary program that prints a border of flowers to the HiRes screen. The source is invaluable in showing how to handle HiRes shapes in assembly language.

Convert Utility: A BASIC program that converts numbers between decimal, hexadecimal, binary and disk sectors.

ProDOSfix.TXT: Apple clone users who've purchased ProDOS will note that it doesn't work on their machines. This text tutorial explains why, and how to remedy the problem.

Each disk is

\$19.95

or, as an introductory offer you
can order all three for

\$39.95

Telephone order credit card
payments accepted.

Ontario residents please add 7%
Provincial Sales Tax.

Software Services
Moorshead Publications
25 Overlea Boulevard,
Suite 601,
Toronto, Ontario M4H 1B1
(416) 423-3262

The Most Valuable Computer Product In Existence

We Offer You Answers

It has been said that computers are the most flexible tools human beings have ever created. This flexibility, however, comes with its price. They are also the most complex.

You are probably an expert in your own field of endeavour but, unless that field happens to be microcomputer applications, you will quite possibly find that you'll be unable to apply computer technology to its fullest potential.

Computers bring with them incredible power . . . and a whole universe of perplexing difficulties.

In creating Computing Now!, Software Now!, Computers in Education, Electronics Today and numerous special publications we have had to become experts in applying microcomputers. We write about them and we use them in the creation of our magazines.

For the first time we are offering our expertise and experience on a consulting basis. We will sit down with you and find solutions to your problems on a one to one basis. We will do it impartially . . . we are not connected with any software or hardware manufacturers and, most important we will advise you based on the latest developments in the industry. We very often know about things which affect microcomputer decisions long before they are released.

We are not able to assist everyone . . . no consultant is. We'll tell you if your problem is beyond us. However, if we are able to accept you as a client you will be able to entrust your problem to one of the most knowledgeable groups of experts available.

We write the magazines that most of the other consultants read.

Let us help you. Among the areas in which we are qualified to consult are:

- ☐ **Choosing a computer and peripherals for your application.**
- ☐ **Writing custom software.**
- ☐ **Designing custom hardware and firmware.**
- ☐ **Writing documentation for your application.**
- ☐ **Patching commercial software for specific purposes.**
- ☐ **Setting up systems.**
- ☐ **Telecommunications and bulletin boards.**
- ☐ **Recovering lost data.**
- ☐ **Assisting you with a choice of software.**
- ☐ **Locating unusual hardware and software.**

For more information contact

**Moorshead Publications
Consultation Services
1-416-423-3262**

or write

**Halvor W. Moorshead
The Moorshead Group
25 Overlea Boulevard, Suite 601
Toronto, Ontario
M4H 1B1**

This Month In Software Now!

Today's computer marketplace, however, has become a bustling bazaar of products. New software appears literally every day, and software vendors come and go as fast as individual products once did. Even industry insiders are having a tough time keeping up with it all.

Yet the pressures . . . the Need to Know . . . have become more onerous. Whether one is on the verge of a hardware purchase, or shopping for some fun 'n games for the home computer, or even in the software business trying to compete . . . there is more demand than ever before to cut through the fog.

SOFTWARE NOW! has risen to the challenge. True to its name, this is the magazine that has now attempted the seemingly impossible: to pull together in one compact package everything you really need to know about the software market . . . Now!

The entire March issue of SOFTWARE NOW! has been dedicated to this single purpose: to catalog over one thousand of today's most popular . . . most IMPORTANT . . . software products. Ranging from Old Classics to products not even on the retailers' shelves at presstime, we have assembled a comprehensive listing of the products YOU need to know about . . . no matter what your micro hardware and operating system.

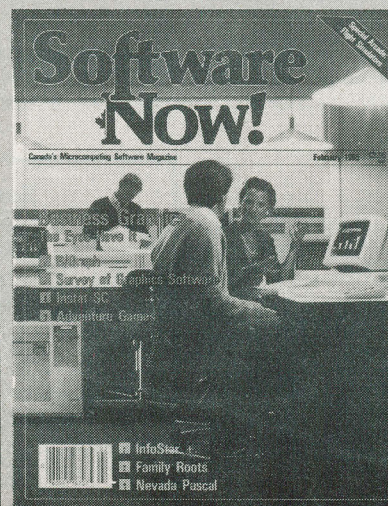
Categories covered in the March Software Now! Survey

Data Managers	Word-Processors
Spreadsheets	Role-Playing Games
Financial & Accounting	Strategy and Simulation
Integrated Software	Educational packages
Arcade Games	Programming Languages
Adventure Games	Utilities
Music	Graphics

The Software Survey forms the perfect complement to the in-depth assessments provided each month in SOFTWARE NOW! A Company supplement provides an invaluable who's-who of the software industry.

For subscriptions call 423-3262

For advertising call 423-3263



**On Sale
Now!**

Introducing MINDSCAPE Software that challenges the mind.



TONK IN THE LAND OF BUDDY-BOTS

Traveling with Tonk through Tink!Tonk! land, children help rescue Tonk's Buddy-Bot friends. The educational games along the way help a child learn visual discrimination by distinguishing shapes and patterns, and develop concentration and memory skills as well.

Available on: Apple® Atari®, Commodore®, and IBM®



MR. PIXEL'S™ PROGRAMMING PAINT SET

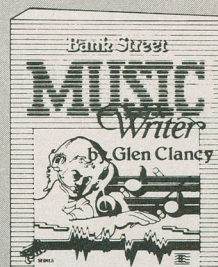
This program allows children to draw in full color on the computer screen. Then, they can change their creations in ways that were never before possible by conventional means. While children are experimenting with their creations, they are also learning pre-programming skills.

Available on: Apple®, Commodore®, IBM®

BANK STREET MUSICWRITER by GLEN CLANCY

If you can hum a tune, you can write a tune. The joy of music and the excitement of composing come to life with Bank Street's new program. Within minutes, beginners can be experimenting with melody, harmony and rhythm.

Available on: Atari®, Commodore®, and soon Apple® and IBM®



CROSSWORD MAGIC™

This program allows you to create your own crossword puzzles, and use them again and again. It's a unique way to study any subject at any level — from English to astronomy, or use just for fun!

Available on: Apple®, Atari®, Commodore®, IBM®



Software Distributors

WE'RE COMPATIBLE

For these and other Mindscape products, see your local Computer Dealer or call (613) 523-7272

Circle No. 1 on Reader Service Card



For the Mindscape
dealer nearest you
call (613) 523-7272

SURPLUSTRONICS

we will not be undersold

8088 Computer

**The Price
Barrier
Smashed!**
\$995



Includes:

- 8088 motherboard with 256K and all parts (except 8087)
- Phoenix Bios
- One 360K DS, DD disk drive and controller
- Power Supply with fan
- Flip-top case

All you need extra is a keyboard, video board and monitor.
8088 Motherboard only with 64K, fully assembled and tested, no Bios (one blank 2764). Expandable to 1Meg on-board memory. Flow soldered. Provision for 8087 **\$299.00**

6502 Systems

The Famous 6502 Board



- Assembled and fully tested (flow soldered)
- 64K, 80 x 24 video with soft-switch, floppy controller.
- System comes with blank EPROM'S on board, does not come with any proprietary software or Basic ... **\$289.00**

Complete System

- 6502 board (as above) as illustrated with case, keyboard and power supply **\$499.00**

Complete System

- Using 6502 board above in IBM style flip-top case, using powerful 75 watt power supply with fan, programmable serial keyboard adaptor, IBM style keyboard **\$599.00**
- As above with one built in disk drive **\$789.00**
- As above with two drives **\$969.00**
- Switching Power Supplies. +5V 5A, +12V 2.8A, +12V 2.0 Amps - 12V 0.5A (open frame) **\$44.95**
- Panasonic Printers (open frame) **\$39.95**

PERIPHERAL CARDS FOR YOUR IBM AND COMPATIBLE COMPUTER

Colour Video Board **\$159.00**

Composite video or RGB Video

Floppy Controller **\$119.00**

Floppy Controller with RS232 .. **\$149.00**

Floppy Controller w. clock/RS232 **\$159.00**

Parallel and Game Port Card ... **\$59.00**

Cable and connector extra.

Peripheral Interface Card **\$139.00**

Includes two serial ports, parallel port, game port and provision for (but not including) real time clock.

Clock/Calendar Option **\$29.00**

With battery backup.

256K Multifunction Board

Includes: Serial port, parallel port, game port, provision for optional real time clock/calendar and socketed for up to 256K RAM.

With 64K RAM **\$175.00**

512K Board. Socketed for 512K including:

64K RAM **\$169.00**

IBM Compatible Disk Drives ... **\$185.00**

Brand New, fresh from factory. Shugart SA455 40 track, double sided, double density Slimline. We have ordered 10,000 from Shugart - that is why we can pass the savings on to you.

IBM Compatible Keyboards

Keytronics programmable (no case) **\$ 64.00**

Maxiswitch **\$129.00**

Cherry **\$129.00**

Case - High Quality

Hinged for easy access, can be supplied with plain back or for 5 or 8 slots. Please specify **\$574.95**

Above case with power supply and fan.

For Apple compatible (75W) **\$169.00**

For IBM compatible (150W) **\$219.00**

PERIPHERAL CARDS FOR YOUR APPLE & COMPATIBLE

Assembled, flow-soldered/cleaned and 100% tested

16K RAM Card **\$49.95**

80x24 video card **\$69.95**

Z80A Card **\$47.00**

Parallel Printer Card (cables extra) **\$49.95**

128K RAM Card with 64K **\$99.00**

128K RAM Card with 128K **\$139.00**

EPROM Programmer with Software **\$63.00**
(programs 2716, 2732, 2732A, 2764)

8" Floppy Controller **\$79.00**

Modem Autoanswer/autodial, touch tone or pulse dial. Plugs right into the system **\$69.00.**

Apple Compatible Disk Drives (SA390) **\$189.00**

Case with numeric keyboard **\$129.00**

Power Supply (Hydro Approved) **\$69.00**

IBM is a registered Trade Mark of IBM Canada Limited Apple is a registered Trade Mark of Apple Canada Limited

Mail Orders add \$5.00 minimum for shipping & handling. Ontario residents add 7% P.S.T. Visa, Mastercard and American Express cards accepted: send card number, expiry date, name of bank and signature. Send certified cheque or money order, do not send cash. All prices on this page are final sale. No warranty, No returns, No refunds but HUGE savings. Warranties available at extra cost.

Surplustronics, 310 College Street, Toronto, Ontario, M5T 1S3

More lines to serve you better
(416) 960-1350

COMPUTER PRESS

continued from page 9



Digital Equipment of Canada Limited has introduced a laser printer equally effective with multi- and single-user systems. The **Digital LN03** prints eight pages per minute (about 333 characters per second) at a text density of 300 dots per inch. Fonts may be added by ROM cartridges, or downloading to RAM cartridges in a multi-user environment. The printer has a serial interface with a selectable baud rate of up to 19.2 kilobaud, and retails for \$5,900.00...

Gandalf Data Limited has announced the availability of their **SAM 224** modem. The full duplex 2400 baud modem offers auto-dial and auto-answer, and can communicate with 300 and 1200 baud modems...



The **Helix** line of bubble memory cartridges for the IBM PC, the Apple II, the Apple //e and their compatibles is being distributed in Canada by **Compusel**. The **Helix PC Bubble Disk** features 512K of non-volatile memory designed to emulate a hard disk. The Apple version, the **ABM Bubble Disk**, offers 128K of non-volatile memory...

Addresses: Digital Equipment of Canada Limited, P.O. Box 13000, Kanata, Ontario K2K 2A6 (613) 592-5111 • Compusel, 2349 Fairview Street, Burlington, Ontario L7R 2E3 (416) 632-2740 • Gandalf Data Limited, 100 Colonnade Road, Nepean, Ontario K2E 7M4 (613) 226-6500 • J.B. Marketing of Canada Limited, P.O. Box 422, Cornwall, Ontario K6H 5T2 (613) 938-3333 • Alhearn and Soper Incorporated, 100 Woodbine Downs Boulevard, Rexdale, Ontario M9W 5S6 (416) 675-3999.

TANDY... Clearly Superior™

IBM PC performance and software selection

without the IBM price tag...

...only with the Tandy 1000 and Tandy 1200 IBM-compatible personal computers.

Tandy computers are engineered to meet the most demanding specifications — at a price that can't be beat. They're backed by the total support of over 100 Radio Shack Computer Centres and 'Plus' Computer Centres with easy-to-reach service facilities and Customer Support, and a large selection of computer accessories — under one roof.

Popular MS-DOS software is available off-the-shelf. And our Express Order Software service offers fast delivery of many more packages from a large variety of vendors.

But the real story is our computers. You will never find MS-DOS performance and value like this from any other computer maker. That's why we say Tandy is Clearly Superior!

Tandy 1000 includes "extras" the IBM PC doesn't offer — Disk Operating System, BASIC and DeskMate, an integrated program that offers word processing, spreadsheet analysis, electronic filing, telecommunications, a calendar and electronic mail. It all adds up to the best \$3000 computer you can buy — for only \$1749. Add a VM-2 monochrome monitor and you're computing for \$1978.95.

Colour monitor, shown, optional



NEW LOW PRICE

Tandy 1200 HD. We've matched the performance of the IBM PC XT for a substantially lower price. Tandy 1200 comes with 256K RAM, and is expandable to 640K. Features one floppy drive and a built-in ten megabyte hard drive. Plus you get a parallel printer interface that's an optional extra on the PC XT. But now you get it all at our new low price — only \$3699. See the Tandy 1200 today.

Colour monitor and graphics, shown, optional

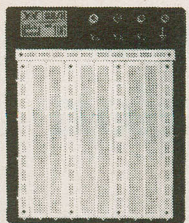


Check the white pages for Radio Shack Computer Centres
IBM is a registered trademark of International Business Machines Corp.

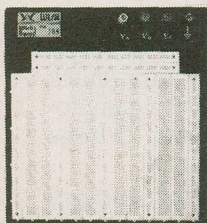
TANDY/Radio Shack

Division, Tandy Electronics Limited

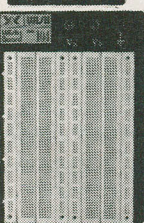
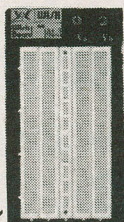
SOLDERLESS BREADBOARD



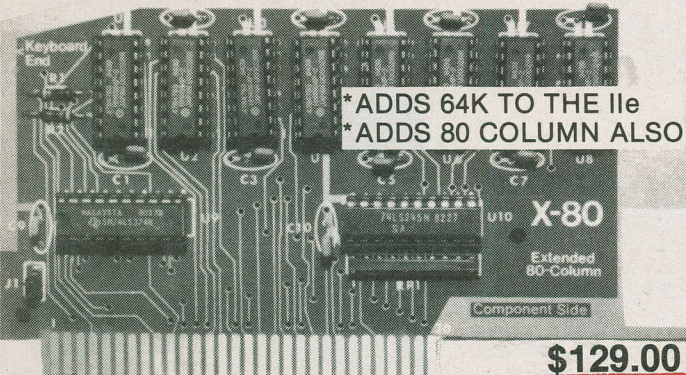
Solderless prototyping boards are the best way to quickly breadboard up a circuit. The holes are made especially for IC's, resistors, and other small parts with 22-28 gage wire leads, takes VVV pins too.



WB-106 \$42.95
3 IC strips, 5 power strips
4 Binding posts, Aluminum plate
WB-104-3 \$29.95
2 IC strips, 1 power strip
2 Binding posts, aluminum plate
WB-108 \$59.95
4 IC strips, 7 power strips
4 Binding posts, aluminum plate
WB-104 \$33.95
2 IC strips, 4 power strips
2 Binding posts, aluminum plate.



EXTENDED 80 COLUMN for Apple IIe



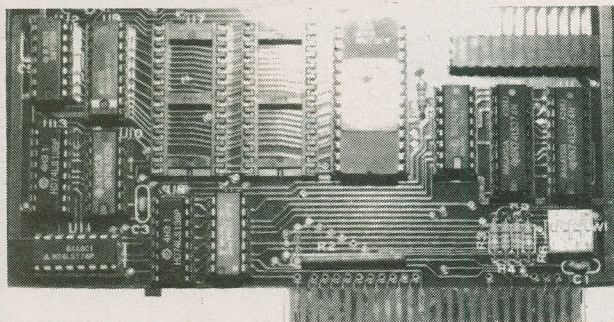
* ADDS 64K TO THE IIe
* ADDS 80 COLUMN ALSO

\$129.00

"NICE PRINT" APPLE II + , IIe CARD

An APPLE II +, APPLE IIe precision parallel printer card for use with EPSON and GEMINI (and similar) to generate multiple fonts, sizes and near letter quality printing. The printer steppers are controlled to give multiple and incremental strike capability to achieve the above.

COMPLETE WITH CABLE **\$119.00**



NICADS

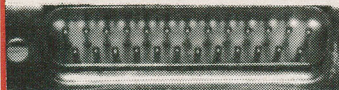
**8.4V
4A.H
7 "D"
CELLS**

A great buy, a pack of 7 brand new GE NICADS giving 8.4v at 4 Amp hours. Each cell is 1.2v and separates easy. Used as 5V backup through a 7805. Gives 5v 1 Amp for 4 hours \$14.95

TRANSFORMERS

(A) Make an IBM linear supply good for 250 Watts. This unit gives +5v @ 20Amps + 12v @ 10Amps and -5, 12 @ 1Amps. Unit gives the proper AC for above \$19.95
(B) 8VAC 5Amp \$ 9.95
(C) 8VAC, 5A, 25VAC, CT, 2.4A \$14.95
(D) 12VAC 1/2 Amp \$ 2.50
(E) 24VAC, 4Amps \$12.95
(F) 1500 WATT ISOLATION/STEP UP/DOWN 110/220, 20 Lbs freight \$24.95
(G) 12VAC 3Amp \$ 7.95
(H) 8V12A, 25VCT, 3.4A, 22V, 4A made for a fully stuffed S-100 system \$24.95

CONNECTORS



DB SERIES

DB-25 M solder \$1.95
DB-25 F solder \$1.95
DB-25 M IDC, Flat cable \$5.95
DB-25 F IDC, Flat cable \$5.95
DB-25 M Right angle PCB \$4.95
DB-25 F Right angle PCB \$4.95
DB-25 Shell \$1.00
DB-15 M solder \$1.95
DB-15 F solder \$1.95
DB-15 F IDC, flat cable \$3.95
DB-15 M right angle PCB \$2.95
DB-15 F right angle PCB \$2.95
DB-15 Shell \$1.00
DB-9 M solder \$1.75
DB-9 F solder \$1.75
DB-9 M right angle PCB \$2.50
DB-9 F right angle PCB \$2.50
DB-9 Shell \$0.75

FLAT CABLE DRIVE CONNECTORS

50 Pin Edge C, 8" drive \$5.95
40 Pin Edge C, \$4.95
34 Pin Edge C, 5-1/4" drive \$5.95
20 Pin Edge C, Hard drive \$4.95
34 Pin Fem header 17 x 2 \$3.50
26 Pin Fem header 13 x 2 \$3.00
20 Pin Fem header 10 x 2 \$2.00
16 Pin Fem header 8 x 2 \$2.00
16 Pin DIP header \$2.00
10 Pin Fem header 5 x 2 \$1.00

2 ROW STRAIGHT HEADERS

50 Pin 25 x 2 \$4.00
40 Pin 20 x 2 \$3.50
34 Pin 17 x 2 \$3.00
26 Pin 13 x 2 \$2.50
20 Pin 10 x 2 \$2.00
16 Pin 8 x 2 \$1.50
10 Pin 5 x 2 \$1.00

2 ROW RIGHT ANGLE HEADERS

40 Pin RA 20 x 2 \$3.50
34 Pin RA 17 x 2 \$3.00
26 Pin RA 13 x 2 \$2.50
20 Pin RA 10 x 2 \$2.00
16 Pin RA 8 x 2 \$1.50
10 Pin RA 5 x 2 \$1.00

1 ROW STRAIGHT HEADERS

Gold \$8¢ per pin
Tin \$4¢ per pin

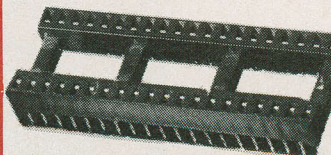
1 ROW RIGHT ANGLE HEADERS

Gold \$8¢ per pin
Tin \$4¢ per pin

CENTRONICS CONNECTORS

36 Pin solder cable male \$8.95
36 Pin Flat cable make IDC \$8.95
36 Pin Chassis female \$6.95
S-100 Edge Connectors \$2.50

SOCKETS



AMP IC SOCKETS

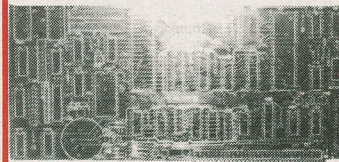
As you know AMP makes the best IC sockets. With a double wipe action and a very wide open target for easy insertion, the best.

6, 8, 14, 16, 18, 20, 24, 28, 40
Pin in stock at only
1.5¢ PER PIN

ASSORTED SEMI-CONDUCTORS AND OTHER STUFF

(A) RED LED S/M/L 10/\$1.00
(B) GREEN LED S/M/L 8/\$1.00
(C) AMBER LED S/M/L 8/\$1.00
(D) PIN PHOTODIODES, INFRA-RED 2/\$1.00
(E) PHOTO TRANSISTOR, NPN VISIBLE 2/\$1.00
(F) LDR (LIGHT DEP RESISTOR) \$1.00
(G) FET ELECTRET MIKE, TINY 10MM \$2.00
(H) 1N4001 10/\$1.00
(I) 1N4004 8/\$1.00
(J) 1N4007 6/\$1.00
(K) 25AMP-600V BRIDGE \$2.95
(L) 25AMP-600V BRIDGE \$3.50
(M) 6AMP-200V BRIDGE \$1.50
(N) 3AMP-200V BRIDGE \$1.00
(O) DIODE 3AMP-600V 3/\$1.00
(P) 1N914/1N4148 Silicon diode 10/\$1.00
(Q) 7805 1AMP-5V regulator 2/\$1.00
(R) 7812 1AMP-12V regulator \$0.75
(S) 78M12 1/2 AMP-12V regulator 2/\$1.00
(T) LM317 Variable 1AMP regulator \$1.50
(U) LM323 5V 3AMP regulator \$2.95
(V) LM350 Variable 3AMP reg. \$3.95
(W) 2 1/2" 80hm mini speaker \$1.50
(X) MINI TOGGLE SWITCH SPDT \$1.95
(Y) MINI PUSH BUTTON SWITCH, NO \$0.50

I/O + TWO



A clever copy of the AST I/O + TWO board with real time clock, game I/O calendar, and parallel and serial ports. A real good short card with assembly data \$24.95

GREAT IBM DEAL

Here's a new great IBM deal that is really good for those of you who are getting into your own system building. This deal includes:::

- * ONE 8 SLOT HINGED LID IBM CASE
- * ONE MBE-XT 8 SLOT CPU BOARD
- * ONE 130 WATT POWER SUPPLY
- * ONE IBM STYLE KEYBOARD
- * ANY 4 BARE IBM PCB

All for \$475.00 A very good value if you were going to buy all this stuff anyway. Complete with all parts lists and assembly data. For same in Megaboard please add \$60.00. A real value.

GREAT CASE DEAL

This is a smaller deal than the above but still a very good one.

- * ONE 8 SLOT HINGED LID IBM CASE
- * ONE MBE-XT 8 SLOT CPU BOARD
- * ANY 4 BARE IBM PCB

All for \$199.00. A good value for any smart builder. With all parts lists and assembly data. For same with Megaboard please add \$60.00. A real value.

\$199.00

COMPUTER
PARTS GALORE INC.
316 College St.
Toronto, Ontario M5T 1S3

Toll Free Orders Only
1-800-387-1385

Order Checking (416)925-8291
Technical Data (416)925-1105

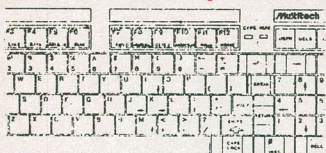
VEP 46 EPROM PROGRAMMER/ERASER

The VEP-46 programmer programs 16K to 128K EPROMs four at a time, with each bit programmable via the host computer. Will also erase up to 10 EPROMs at a time. Ideal for small production runs or EPROM development work. Specify Apple or IBM host adapter **\$449.00**

SWITCHING POWER SUPPLY

SPECS: + 5 VDC 5 AMPS MAX.
#1 + 12 VDC 2.8 AMPS MAX.
#2 + 12 VDC 2.0 AMPS MAX.
- 12 VDC 5 AMPS MAX.
INPUT: 115 or 230 VAC 60Hz **A Best Buy at \$46.95 each**

APPLE® DETACHED KEYBOARD \$159.00



The excellent MARK-II Apple detached keyboard using serial data (IBM) format. Plugs directly into Apple PCB

GREAT DEAL

THE GREAT DEAL CARRIES ON FOREVER AND GETS BETTER

Our proven 6502 motherboard plus a numeric case plus a black beauty power supply plus a numeric function keyboard plus any 4 bare pcb for **\$225.00**

SOLID ABS CASE NUMERIC \$59.95



OUR 6502 BOARD

Now only \$29.95 still with all the versatility of the original and a full 8 slots.



ASCII KEYBOARDS



Now, we have a new keyboard, micro controlled with 3 levels of pre-coded functions for Basic, CPM etc. and at the same old price as before.

Function Keyboard, Numeric \$89.95
Function Keyboard, Standard \$79.95

SYSTEM SAVIOUR

2 grounded 3 wire switched sockets, pilot light, surge protector and on-off switch to turn off your system and two plugged in items **\$45.00**

POWER SUPPLY CSA APPROVED

Our Famous "BLACK BEAUTY" power supply, now reduced in price but not in quality. Our ratings are 5V-5A; 12V-2.5A; 5A-1/2 A; -12V-1/2A for real **\$79.95**

COMPUTER PARTS GALORE INC.

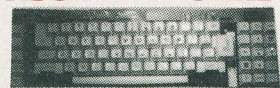
316 College St.
Toronto, Ontario M5T 1S3

Toll Free Orders Only
1-800-387-1385

Order Checking (416)925-8291
Technical Data (416)925-1105

MAIL ORDERS: We accept VISA; MC; AMEX; credit cards. Money orders, cheques (2 week wait) are also OK. Minimum packing and handling fee \$5.00 or 5%, whichever is larger. The only COD we use is via CANPAR (Add \$4.00 COD fee) or motor freight. We do not use postal COD at all. All Ont. res. add 7%. All prices are subject to change without notice. Returns are subject to a 20% restocking charge.

ASCII KEYBOARD



This is a high quality Hall Effect keyboard made by Microswitch of Canada for AES data and now bought by us for 10% of the \$169.00 that AES paid for them in 10,000 lots. They are a very good word processing keyboard with both serial and parallel data outputs for use with APPLE and IBM type systems and come complete with a ribbon cable connector and complete pin-out. **\$24.95**

WIRED CARDS

16K	\$ 45.00	Applaext 128K	\$140.00
128K no IC	\$ 34.95	Sprte gr.	\$ 69.95
128K OK	\$ 55.00	TMS9918A IC	\$ 18.95
128 64K	\$ 99.00	DISC SHMRCK	\$ 45.00
128K 128K	\$150.00	80 Column	\$ 65.00
MC3242 IC	\$ 12.00	80 Col. Sofsw.	\$ 69.00
DISC	\$ 45.00	Nice Print	\$ 69.95
Z-80	\$ 45.00	Gripper	\$ 50.00
Appacard	\$150.00	Grip cable	\$ 19.95

NEW LOW BARE PCB PRICES*

GROUP 1 \$7.00 each	
• Real time clock	• PIA card
• Rana 4 drive	• EPROM
• 9 V Music	• WILD CARD
• Disc Controller	• SAM TALKS
• Disc Controller (Shamrock)	• COMMUNI-CATIONS
GROUP 2 \$9.00 each	
• Gripper	• RGB
• 80 Column	• Sprite graphics
• 80 Column Soft Switch	• APPLACARD 128K
• Z-80	• ADD ON
GROUP 3 \$11.00 each	
• SSM MODEM	• APPLACARD
• PARAT EPROM	• PROG
• 16K	• 128K

All boards come with a parts list and placement diagram. We have all the parts of the PCB's just ask for them.
*Prices so low we require payment with order.

MEMORY FLASH

256K-150Ns DRAM	\$23.95
64K-150Ns DRAM	\$ 3.95
64K-200Ns DRAM	\$ 3.95

Prime stock, limited quantity.

SWITCHING P.S.



Another great bargain from PARTS GALORE, A small power supply switching style that give +5v-4A; ±12v 1A and -5v (adjustable) on a compact 4x8" open frame PCB. Cost Northern Telecom \$50.00 when they bought 5000 pieces. We got em when a subcontractor went belly up for 10% of that price and we are selling em for **\$18.95** NEW IN BOX TESTED AC power cable (3 Wire) for above **\$2.50**



IBM is a registered trademark of International Business Machines

MEGA-BOARD™

Eight Compatible I/O Interface Connectors (Full PC compatible) (compatible with all IBM PC plug-in cards)

Special J1 Interface (Allows horizontal mounting of compatible expansion cards for easy bus expansion and custom configuring) (Board has 62 pin gold plated compatible connector)

Extended ROM Capability (Runs all compatible PC ROMs) (Jumper program made to accommodate all popular 8K, 16K, 32K and 64K ROM chips and NEW EE ROMs) VPP power pin available for EP ROM burning) (External VPP voltage required)

Full Mega-Byte Ram Capacity! On board! (With parity)
□ 256K Bytes using 64K chips
□ 1 Mega Bytes using 256K chips

Mega-Board® \$99.95
With full assembly data.
Mega-Board® Users manual with schematic, ap. notes and theory, etc. \$19.95
MEGA-BIOS®, a fully MS-DOS, PC-DOS compatible non-infringing BIOS \$29.95

ONLY! **\$99.95** Evaluation Board Kit

Standard Key-board interface (Full PC compatible)
Hardware Reset (Overcomes reset law in PC)
Power Connector (Full IBM® pinout compatible)
8088 Processor (Same as PC)
8087 Numeric Processor (Same as PC)
Peripheral Support Circuits (Same as PC)
Configuration Switches (Same as PC)
Speaker/Audio Port (Same as PC)
Wire Wrap Area (To facilitate special custom applications!)

FULL IBM - PC™ COMPATIBILITY!

WIRED N TESTED

- (A) Tested 64K MEGABOARD with MEGABIOS, Manual and Schematics **\$475.00**
- (B) Socketed and wave soldered MEGABOARD with detailed parts list **\$195.00**
- (C) Memory expansion, each 64K tested **\$ 59.95**
- (D) Memory chips 4164-150ns ...9 pcs. **\$ 45.00**
- (E) 256K DRAM **price on request**

SYSTEMS

The basic MEGABOARD system with 64K, one 1/2 size DS/DD Disc Drive, Drive controller and Color Video board with MEGABIOS and manual and schematics **\$1450.00**

The basic MBE-XT system with 64K, one 1/2 size DS/DD Disc Drive, Drive controller and Color Video board with MEGABIOS, manual and schematics **\$1350.00**

Take note both the above systems are 8 expansion slot systems and are XT compatible with 0.8" slots

10 MB 1/2 HT Hard Disc Drive and controller are available for only **\$1195.00**

BARE PCB FOR IBM™

- (A) Color Graphics (PERSYST) **\$27.95**
- (B) Monochrome Graphics **\$24.95**
- (C) Disc Controller **\$17.95**
- (D) Disc Controller with game port **\$24.95**
- (E) Disc Controller with parallel port **\$24.95**

- (F) Multifunction (11) card **\$24.95**
- (G) Parallel printer card **\$17.95**
- (H) Serial RS-232 card **\$17.95**
- (I) Simple Modem card **\$17.95**
- (J) Diskette for above **\$ 8.00**
- (K) 512K Memory card **\$24.95**
- (L) 256K small memory card **\$19.95**
- (M) IBM Extender card, 6" **\$19.95**
- (N) WW Prototype, D89, 25 Full size **\$24.95**
- (O) WW Memory Prototype, a unique card with 1/2 the area WW holes with a 256K/1M byte memory gridded in for 64K/256K RAMS **\$24.95**

All card come with a parts list and placement diagram. We have all Proms and H to G parts.

MEGABOARD/MBE-XT PARTS

INTEL/AMD chip set	\$85.00	62 Pin edge conn	\$ 2.50
8253-5	\$ 7.95	50 Pin edge conn	\$ 2.50
8259A	\$ 7.95	5 Pin DIN	\$ 1.50
8237A-5	\$17.95	IBM Power conn.	\$ 1.50
8255A-5	\$ 9.95	4.7Kx6 SIP	\$ 0.90
8284	\$ 7.95	4.7Kx9 SIP	\$ 1.00
8288	\$16.95	4.7Kx 15 Res net	\$ 1.00
8087-3	\$199.00	8.2Kx 15 Res net	\$ 1.50
8088	\$16.95	33x8 Res net	\$ 1.50
8272	\$17.95	Mega board prom	\$ 9.95
UPD765	\$17.95	Mega bus bars ea.	\$ 1.50
100Ns time delay	\$ 7.50	0.1uf .1 or .2"	\$ 0.14
7Ns Time delay	\$14.95	Mega trim cap	\$ 1.00

MBE-XT \$49.95



Here it is, a 256K XT compatible 8088 machine that works like an IBM. Note has 8 slots on 0.8" spacing to use modern XT peripherals, unlike the BEST which has only 5 on 1" spacing. The MBE-XT will hold any legal or illegal BIOS or BASIC. We suggest the MEGABIOS, one of the better ones available.

- (A) MBE-XT with assembly data and parts list **\$49.95**
- (B) Complete schematics and manual \$ 4.95
- (C) Wave soldered MBE-XT board without any IC's, all sockets, edge conn. R.C. Etch with manual and full schematics. You just add IC's **\$175.00**
- (D) As above but fully stuffed with all IC's and 64K of RAM on board with BIOS and M&S **\$395.00**

SA/455A3

5-1/4" HALF SIZE DRIVES

• 40 Track per side • Latest head & drive technology • Double-sided, double density • Fast access time **\$189**

Two of These Half Size Drives will Fit in the Same Space as 1 Full Size Drive!

CHERRY IBM® \$129 STYLE KEYBOARD

At last a good low cost keyboard for the IBM PC, XT or compatible machine. Uses capacitive keys, has a very good feel, and has TYPEWRITER LAYOUT for easy word-processing at the very low price of **\$129.00**

IBM CASE

We have the case for you, the newest type with 8 slots to the MBE-XT board, has hinged lid and all mounting hardware **\$89.95**

Same as above for MEGABOARD, 7 Slot **\$99.95**

Older type, top opening for Apple PCB to look like IBM system, holds 2 drives. **\$69.95**

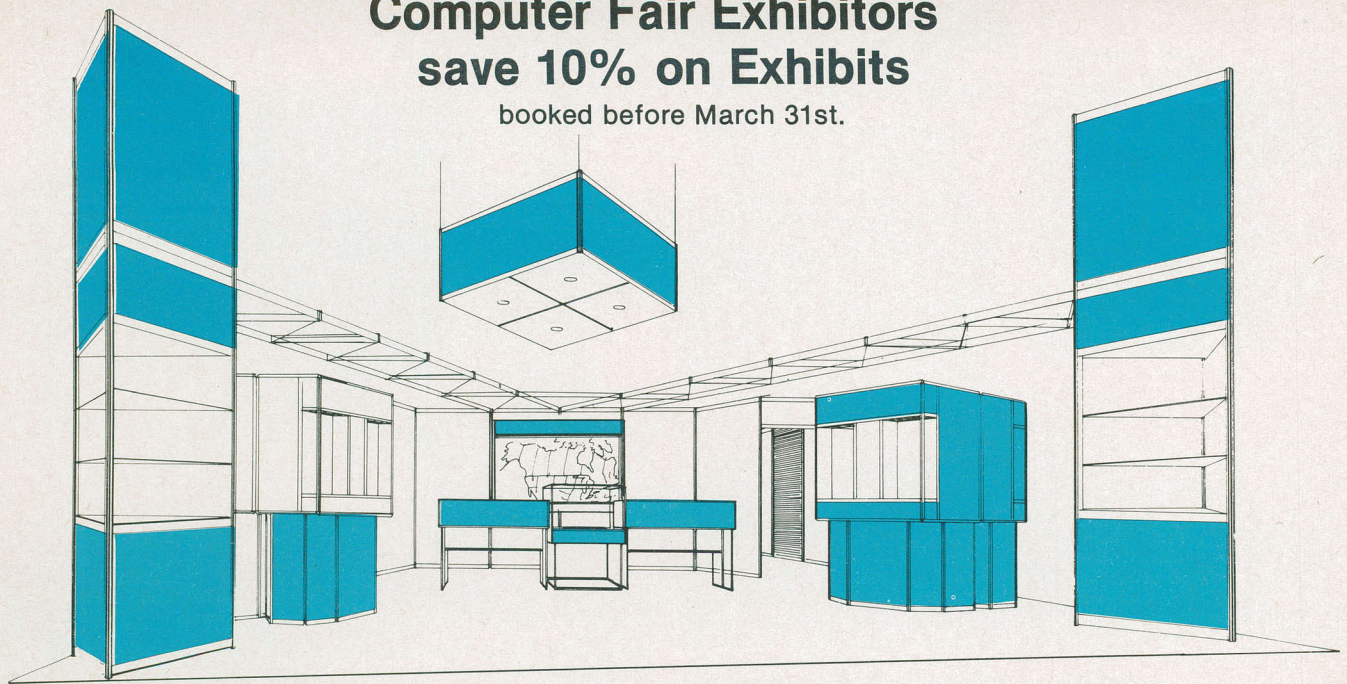
SWITCHING POWER SUPPLY

110V, 60Hz with Fan and two rear switched outlets.

These power supplies fit the above case
100 WATT +5v-10A; +12v-3.5A; ±12V-1/2A **\$139.00**
130WATT +5V-14A; +12v-4.2A; ±12V-1/2A **\$169.00**

Computer Fair Exhibitors save 10% on Exhibits

booked before March 31st.



C.A.W. DISPLAYS
5151 Everest Drive,
Unit 8, Mississauga,
Ont. L4W 2Z3
TEL. (416) 624-0989

**Free Consultation
Free Installation & Removal
Standard Exhibits —
Custom Design**

C.A.W. DISPLAYS highly skilled personnel enable us to offer you the highest quality in exhibits, office interiors, and store fixtures.

Circle No. 25 on Reader Service Card For more information, call or visit our Showroom

Advertisers Index

Advance Interface Electronic Ltd.	47
Ahearn & Soper Inc.	6, 7
Budgetron Inc.	25
CAW Displays	78
Classic Organ Company Ltd.	15
Computech Micro Design	38
Computer Mail Order	13
Computer Parts Galore	76, 77
Computron	4, 58
Dennison Manufacturing Canada Inc.	8
Electronic Control Systems.	67
Emulex Corporation	79
Exceltronix	2, 3
Frantek Software	73
Genemation Inc.	49
Gentek Computers Inc.	35
Griffco Marketing Inc.	18, 80
Hewlett-Packard (Canada) Ltd.	63
JSOFT Ltd.	67
Kitstronic International Ltd.	70
Radio Shack	75
Smith Corona	31
Software Supply	26
Surplustronics	74
3rd Wave Media Consultants	69
TEO	45
Tithes Business Systems (Canada) Inc.	61
Toronto RCP/M	78
Tycor Electronic Products Ltd.	55
Xerox Canada Inc.	23

TORONTO RCP/M SYSTEMS is now CANADA REMOTE SYSTEMS

9 Remote access systems.
\$30 per year access
charge. Datapak avail-
able. 150 Megabytes on-
line. 24 hour service.

30,000 Programmes
available by mail. From
\$10 per disc. For over 200
CP/M, MSDOS and IBM
computers.

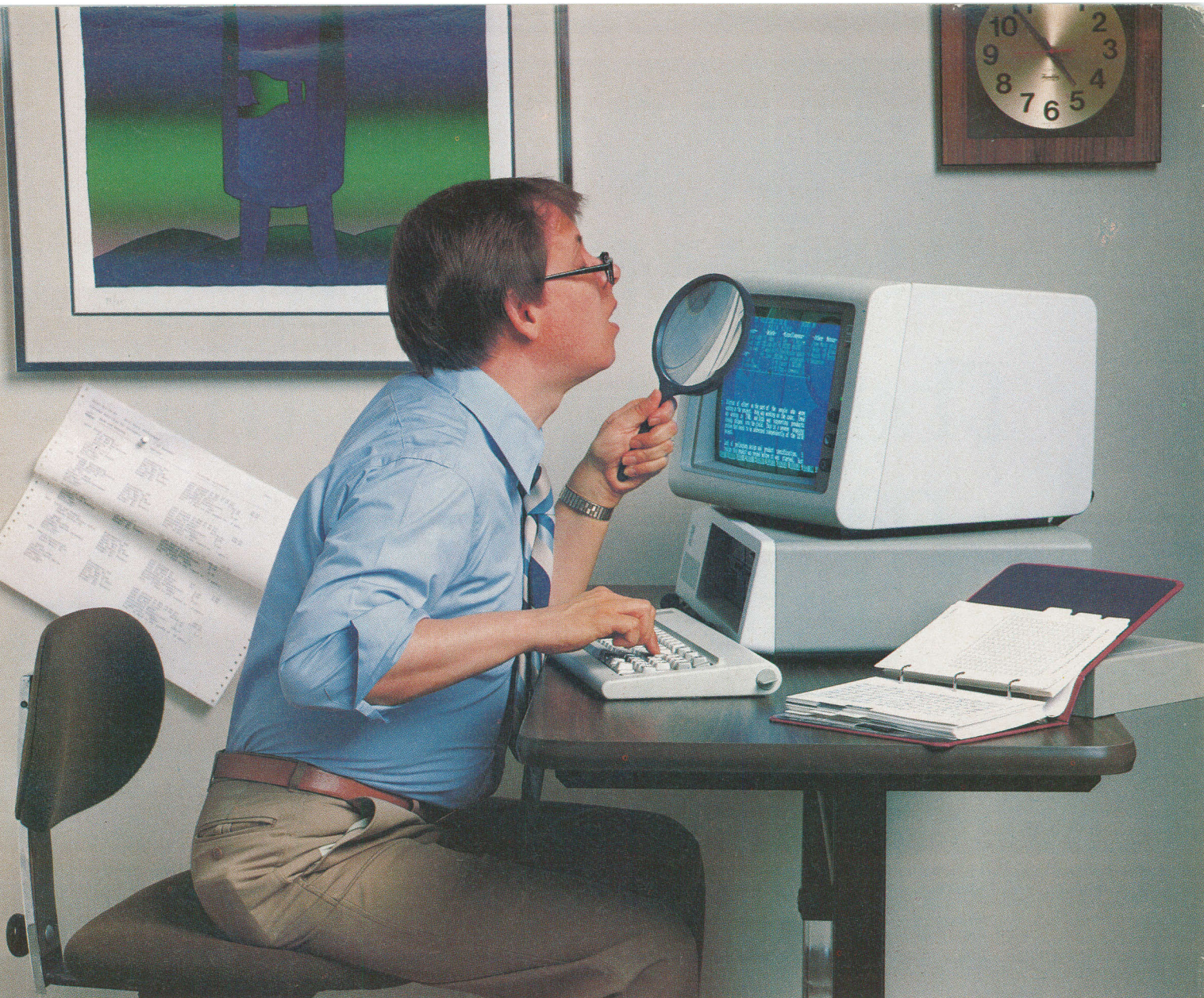
Full line of commercial
software and modems

416-239-2835

For a free mini-catalog, to
join or to order:

**CANADA REMOTE
SYSTEMS**

Circle No. 12 on Reader Service Card



If you're not getting sharp, clear images on your PC, don't give up. Persyst.

Get high resolution text on a color monitor with BoB™

Now you can throw away your magnifying glass, because Persyst has a better way to clear up fuzzy images and all the mistakes they can cause on a high resolution monitor.

With the Persyst BoB Display Adapter you can combine high resolution text with all IBM color graphics software on a color monitor. BoB delivers its high resolution by using almost twice as many dots as other boards to form characters.

And, because BoB has total IBM color graphics software compatibility, it opens the door to a massive amount of standard software. Now you no longer have to decide between monochrome adapters that can't give you

graphics and color adapters that sacrifice text resolution. With BoB you can have it all!

Get full IBM color graphics software compatibility on a monochrome monitor.

BoB is the perfect low cost method of running graphics that don't require color. Because BoB has the ability to run *all* IBM color graphics software on a high resolution monochrome monitor. And BoB uses the entire display area, so your graphics will be full-sized. **Customize BoB to your specific application.**

BoB lets you design and download up to 256 custom characters. In any combination of language, scientific notation or graphic sets. So you can tailor character sets to your specific needs. Super sharp graphics for special

applications are also routine because BoB supports a 640 x 400 high resolution mode.

The Persyst BoB Display Adapter is a product of Emulex Corporation, an industry leader in the development of high performance controllers, communications products and packaged subsystems for PCs, micro, mini and super minicomputers.

For more information call or write us today. Persyst Products, Emulex Corporation, 5945 Airport Road, Suite 288, Mississauga, Ontario, Canada L4V 1R9 Tele: (416) 637-1211, Twx 610-492-4242

EX PERSYST
PERSYST
EMULEX PERSYST

Circle No. 8 on Reader Service Card



Maxell Gold.

The floppy disk that
packs more facts
into Compaq,[®]
sets HP[®] free,
and takes IBM[®]
Portable where it's
never gone before.

It's great to have a portable computer.
Especially when your data stays put.
For error-free performance at home or
abroad, trust Maxell. The Gold Standard
in floppy disks. There's a Maxell disk
for virtually every computer made.
Each is backed by a lifetime warranty.
Maxell. Accepted everywhere,
without reservation.

Griffco

Griffco Marketing Inc.

maxell[®]
IT'S WORTH IT.

